SEPTEMBER 1935

Journal of Educational Research

Registered June 4, 1929

CONTENTS

		PAGE
A Frequency Study of Physical Handicaps in Reading Disability and Unselected Groups	*Thomas Harrison Eames*	1
An Experimental Study of Individual Improvement in Spelling	*John C. Almack and Elmer H. Staffelbach*	6
A Comparison of Two Methods of Teaching High School Algebra	*Richard Drake*	12
The Effects of Premature Drill in Third-Grade Arithmetic	*William A. Brownell and Charlotte B. Chazal*	17
The Content of Examinations in Certain Professional Education Courses	*W. I. Painter*	29
New Data on Early Engineering Education	*H. G. Good*	37
Editorials: Expressing the Scientific Spirit Through Better Supervision	*A. S. Barr*	47
Editorials: Personality and Citizenship	*An Observer*	52
Reviews		55
Research Abstracts and Bibliographies		60
Research News and Communications		66

THE JOURNAL OF EDUCATIONAL RESEARCH is indexed in the Education Index

---

Copyright 1935, by Public School Publishing Co.

Entered as second-class matter at the Post Office at Bloomington, Illinois, under the act of March 3, 1879

JOURNAL OF EDUCATIONAL RESEARCH

EDITORIAL BOARD

A. S. BARR, *Chairman, Professor of Education, University of Wisconsin, Madison, Wisconsin*

E. J. ASHBAUGH, *Dean, College of Education, Miami University, Oxford, Ohio.* Administration, Supervision, and Teacher Training.

HARRY J. BAKER, *Director, Psychological Clinic, Detroit Public Schools, Detroit, Michigan.* Child Welfare, Guidance, and Development.

LEO J. BRUECKNER, *Professor of Education, University of Minnesota, Minneapolis, Minnesota.* Elementary Education.

CARTER V. GOOD, *Professor of Education, University of Cincinnati, Cincinnati, Ohio.* Teaching, Learning, and Individual Differences.

KAI JENSEN, *Assistant Professor of Education, University of Wisconsin, Madison, Wisconsin.* Preschool Education.

CHARLES W. KNUDSEN, *Professor of Education, George Peabody College, Nashville, Tennessee.* Secondary Education.

A. K. LOOMIS, *Principal, University High School, University of Chicago, Chicago, Illinois. Curriculum Construction.*

CLIFFORD WOODY, *Director, Bureau of Educational References and Research and Professor of Education, University of Michigan, Ann Arbor, Michigan.* Measurements, Statistics, and Research.

To save time, manuscripts may be sent directly to members of the editorial board as indicated above.

ASSOCIATE EDITORS

FRED C. AYER, *Professor of Educational Administration, University of Texas, Austin, Texas*

FOWLER D. BROOKS, *Head of Departments of Education and Psychology, DePauw University, Greencastle, Indiana*

WILLIAM A. BROWNELL, *Professor of Educational Psychology, Duke University, Durham, North Carolina*

B. R. BUCKINGHAM, *Lecturer in Education, Harvard University, Cambridge, Massachusetts*

W. W. CHARTERS, *Director, Bureau of Educational Research and Professor of Education, Ohio State University, Columbus, Ohio.*

VIRGIL E. DICKSON, *Assistant Superintendent of Schools and Director of Bureau of Research and Guidance, Berkeley Public Schools, Berkeley, California.*

EDGAR A. DOLL, *Director, Department of Research, Training School, Vineland, New Jersey*

WILLIAM S. GRAY, *Director, Teacher Training, University of Chicago, Chicago, Illinois*

CHARLES E. GREENE, *Assistant Superintendent of Schools, Denver Public Schools, Denver, Colorado*

M. E. HAGGERTY, *Dean, College of Education and Professor of Education, University of Minnesota, Minneapolis, Minnesota*

V. A. C. HENMON, *Chairman, Department of Psychology and Professor of Psychology, University of Wisconsin, Madison, Wisconsin*

KARL J. HOLZINGER, *Professor of Education, University of Chicago, Chicago, Illinois*

ERNEST HORN, *Director, University Elementary School and Professor of Education, State University of Iowa, Iowa City, Iowa.*

EARL HUDELSON, *Dean, College of Education and Professor of Education, West Virginia University, Morgantown, West Virginia*

FREDERICK J. KELLY, *Chief, Section of Colleges and Professional Schools, Office of Education, Department of the Interior, Washington, D. C.*

WILLIAM A. McCALL, *Professor of Education, Teachers College, Columbia University, New York City*

W. J. OSBURN, *State Teachers College, Buffalo, N. Y.*

SHELTON PHELPS, *President, Winthrop College, Rock Hill, S. C.*

DOUGLAS E. SCATES, *Director, Research and Statistics, Cincinnati Public Schools, Cincinnati, Ohio*

JESSE B. SEARS, *Professor of Education, Stanford University, California*

FRANCIS T. SPAULDING, *Associate Professor of Education, Harvard University, Cambridge, Massachusetts*

JOHN L. STENQUIST, *Director, Bureau of Educational Research, Department of Education and Lecturer, Johns Hopkins University, Baltimore, Maryland*

PERCIVAL M. SYMONDS, *Associate Professor of Education, Teachers College, Columbia University, New York City*

W. W. THEISEN, *Assistant Superintendent of Schools, Milwaukee, Wisconsin*

M. R. TRABUE, *Director, Occupational Research Program, United States Employment Service, Department of Labor, Washington, D. C.*

W. L. UHL, *Dean, School of Education, and Professor of Education, University of Washington, Seattle, Washington*

CARLETON W. WASHBURNE, *Superintendent of Schools, Winnetka Public Schools, Winnetka, Illinois*

GUY M. WHIPPLE, *Secretary, National Society for the Study of Education, Clifton, Massachusetts*

ELIZABETH L. WOODS, *Supervisor, Educational Research and Guidance, Los Angeles City Schools, Los Angeles, California*

G. A. YOAKAM, *Professor of Education and Director, Courses in Elementary Education, University of Pittsburgh, Pittsburgh, Pennsylvania*

THE JOURNAL OF EDUCATIONAL RESEARCH is published at Bloomington, Illinois, monthly, except June, July, and August by the Public School Publishing Company. The subscription price is $3.50; $3.50 in Canada or Mexico; and $3.80 in other foreign countries.

Subscriptions and all communications about reprints or other business matters should be addressed to the PUBLIC SCHOOL PUBLISHING COMPANY, at Bloomington, Illinois.

Address all communications on editorial matters to A. S. Barr, Department of Education, University of Wisconsin, Madison, Wisconsin.

JOURNAL *of* EDUCATIONAL RESEARCH

Volume XXIX September, 1935 Number 1

A FREQUENCY STUDY OF PHYSICAL HANDICAPS IN READING DISABILITY AND UNSELECTED GROUPS

THOMAS HARRISON EAMES
Lecturer, Boston University School of Education

THE etiology of reading disability falls into two gross classes: (1) Psycho-educational causes, and (2) Physical causes. The physical causes are the more fundamental, and clinical experience has proven that treatment should be directed to these first. The psycho-educational causes may be attacked during or after the period of physical treatment. One hundred reading disability cases and a control group of one hundred forty-three unselected school children were examined with particular attention to the various physical handicaps which have been demonstrated as causative factors in reading disability. The age range in each group was approximately the same. The frequency of all of the physical factors was determined for each group (Table I). The conditions are arranged in order of their descending frequency in the reading disability group.

Incoördination of the eyes is the most frequent of the physical factors and presents the greatest difference between the groups, occurring much more frequently among the poor readers. Exophoria[1] is the predominant type of incoördination in both groups and is much more frequent among the cases of difficult reading. It results in the early onset of fatigue, insufficiency of convergence in reading, impaired fusion, irritability and

[1] Eames, T. H. "A Comparison of the Ocular Characteristics of Unselected and Reading Disability Groups," *Journal of Educational Research*, XXV (March, 1932), p. 211.

Eames, T. H. "Physiologic Exophoria in Relation to Age," *Archives of Ophthalmology*, IX (January, 1933), p. 104.

May, C. H. *Diseases of the Eye* (New York: Wm. Wood & Co., 1924), p. 381.

Selzer, C. A. *Lateral Dominance and Visual Fusion*. Harvard Monographs in Education, No. 12 (Cambridge, Massachusetts: Harvard University Press, 1933), p. 86.

inattention. The typical exophoric reading disability patient works well for a few minutes at the beginning of the reading lesson but soon loses interest, gives little or no attention and makes no further effort. The usual school eye tests do not disclose the presence of incoördination.

Farsightedness[2] operates as a factor in poor reading by causing fatigue which is followed by either blurred vision or discomfort ranging from a tired feeling to sharp ocular and frontal pain with nausea and vomiting. The low and medium grades of farsightedness are more troublesome to poor readers than the high grades of the defect because a rather unsuccessful muscular compensation can be made for the lower degrees. If kept up long enough this upsets the accommodation-convergence reflexes,[3] produces early fatigue in reading, and results in inattention followed by pain and later by gastro-intestinal disturbances. Distant vision is usually normal, particularly when the child is rested, hence the ordinary school eye tests do not demonstrate the presence of any but the extreme cases.[4]

Anomalies of eyedness[5] include left-eyedness and ambieyedness. The former interferes with the process of learning to read by interfering with the normal course of the visual memory reflexes.[6] Ambieyedness is a condition in which there is rivalry between the brain centers controlling the eyes, and its effect on reading is in loss of place, regression, and sometimes limitation of eye span.

Mixed dominance of hand and eye is next in frequency. It implies a dominance of the hand on one side of the body and the eye on the opposite side. It is supposed to interfere with reading by making necessary more complicated eye-hand and visual memory reflexes.[7] The speed of reading is retarded and comprehension of what is read is often impaired.

[2] May, C. H. *Diseases of the Eye* (New York: Wm. Wood & Co., 1924), pp. 328-329.

[3] Laurance, Lionel. *Visual Optics and Sight Testing* (London: The School of Optics, Ltd., 1920), p. 224.

[4] Eames, T. H. "Detection of Eye Defects," *Journal of Education* (March, 1930), p. 255.

[5] Mayer, Leo L. "Congenital Reading Disability—Strephosymbolia," *Journal of the American Medical Association*, C (April, 1933), p. 1152.

[6] Eames, T. H. "The Anatomical Basis of Lateral Dominance Anomalies," *American Journal of Orthopsychiatry*, IV (October, 1934), pp. 524-528.

[7] *Ibid.*

Low fusion[8-9-10] is a condition in which the two images sent back to the brain, one from either eye, are not properly blended into one mental picture. In reading it produces confusions, mixing of letters and small words, jumbling of words, loss of place, and some inability to follow lines across the page. Its presence is not detected by the usual school vision tests and it presents no obvious symptom or sign that the teacher may detect.

General physical difficulties[11] as a group present a somewhat greater frequency in the reading disability group. Their effect on reading depends on the nature of the condition or disease but in general they impede learning by a reduction of vitality and impairment of general health. In many cases these difficulties result in loss of time from classes. The specific handicaps in reading presented by each of the general physical conditions enumerated in the table are being investigated in a separate study and the findings will be reported when available.

The frequency of astigmatism[12] is lower in the reading disability group. Nevertheless, severe cases interfere with reading by distorting the visual images and by the production of eyestrain. In such cases lines of print are hard to follow, writing may be produced at an angle with the horizontal, letters are often confused, and frequent headaches, with or without nausea and vomiting are not uncommon. The child may hold his head on one side habitually. Vision is usually reduced in proportion to the degree of the defect. Very few astigmatic non-readers are encountered in clinical work but when they come in they present marked disability.

Anomalies of handedness fall in next to the lowest place in the frequency scale for the reading disability group. They include left handedness and ambidextrousness. The frequency in the reading disability

[8] Troland, L. T. "Visual Phenomena and their Stimulus Correlations," *Foundations of Experimental Psychology* (1929), p. 211.

[9] Verhoeff, F. H. "Binocular Perspective," *American Journal of Physiologic Optics*. Vol. VI.

[10] Eames, T. H. "Low Fusion Convergence as a Factor in Reading Disability," *American Journal of Ophthalmology*, XVII, August, 1934.

[11] Most of the general physical examinations in the reading disability group were made by Harold P. Freeman, M.D., and G. Stanley Miles, M.D. All eye examinations and dominance tests were made by the author.

[12] Laurance, Lionel. *Visual Optics and Sight Testing* (London: School of Optics, Ltd., 1920), p. 148.

group is only 2 percent greater than in the other and although much has been made of abnormal handedness as a cause of poor reading it is probable that, by itself, its inhibitory effect on reading is slight. It is the writer's opinion based on experience in private practice and clinical work that handedness abnormalities are important in reading only when considered in relation to eyedness and other lateral dominance factors.

Nearsightedness[13] is an infrequent offender in poor reading and falls at the bottom of the list. Low degrees of the defect may be favorable to reading by making it unnecessary for the child to exert the usual amount of accommodative effort. It interferes with reading only when the far point of clear vision is closer to the eyes than the comfortable reading distance, thus leading to postural abnormalities and sometimes to slow-

TABLE I

FREQUENCY OF PHYSICAL HANDICAPS IN READING DISABILITIES

Physical handicap	Reading disability group	Control group	Difference
Incoördination of eyes at the reading distance	69%	22.3%	46.7%
a. Exophoria	63	16.7	46.3
b. Esophoria	6	5.5	0.5
c. Hyperphoria	0	0.0	0.0
Farsightedness	53	27.6	25.4
Anomalies of eyedness	51	39.0	12.0
Mixed dominance	49	30.0	19.0
Low Fusion	44	18.0	26.0
General physical	36	31.5	4.5
a. Lymphatic system	8	0.1	7.9
b. Nose and Throat	8	9.7	1.7
c. Circulatory	5	0.1	4.9
d. Gastro-intestinal	2	0.8	1.2
e. Tuberculosis	2	0.02	1.98
f. Other conditions	11	19.9	8.9
Astigmatism	30	43.9	13.4
a. Farsighted Astigmatism	27	36.2	9.2
b. Nearsighted Astigmatism	3	7.2	4.2
Anomalies of Handedness	14	12.0	2.0
Near-sightedness	3	7.2	4.2

Number of cases in reading disability group 100
Number of cases in unselected group:
Eye conditions 143
Eyedness, handedness, and mixed dominance 100
General physical 8333

[13] Laurance, Lionel. *Visual Optics and Sight Testing* (London: School of Optics, Ltd., 1920), p. 126.

Kerr, James. *Fundamentals of School Health* (New York: Macmillan Company, 1927), pp. 497-498.

ness in the speed of reading. The complications of near-sightedness are more important than the condition itself, hence the defect should always be watched carefully and treated whether there is reading trouble present or not. Fortunately this is one condition in which the usual highly inadequate school eye tests are efficient.

WANTED

February, 1935, JOURNAL OF EDUCATIONAL RESEARCH.
March, 1935, JOURNAL OF EDUCATIONAL RESEARCH.

If you have these issues and are willing to part with them at fifty cents per copy, please write to:

PUBLIC SCHOOL PUBLISHING COMPANY
Bloomington, Illinois

AN EXPERIMENTAL STUDY OF INDIVIDUAL IMPROVEMENT IN SPELLING

JOHN C. ALMACK
Stanford University
and
ELMER H. STAFFELBACH
State Teachers College, San Jose, California

THAT spelling errors occur in the written compositions of school children is a fact well known to teachers of English. Such errors are found in the written papers of pupils of all grades. Sadly enough, the daily teaching of lists of spelling words usually proves ineffective as a means of eliminating such errors.

During the spring semester of 1933 the writers carried out a brief study of one method of eliminating spelling errors from the written compositions of pupils. The study was conducted as a part of the regular class work of the low-seventh grade of the Woodrow Wilson Junior High School of San Jose, California. A total of 104 low-seventh grade pupils were included in the study. The total time of the study covered a period of about six weeks.

A Basic Assumption.—At the outset the writers assumed that pupils make spelling errors in their written composition for the reason that they know how to use certain words which they are unable to spell. On the basis of this assumption it seemed logical that any effective method of eliminating spelling errors would of necessity have to be diagnostic in character. The problem, therefore, seemed to divide itself into three parts:

1. To discover, by a process which would be individually diagnostic, what words the pupils were able to use but unable to spell.

2. To set conditions under which each pupil should be helped to master the spelling of the words in his own active vocabulary.

3. To check under normal conditions the results obtained by these procedures.

Diagnosing the Individual Pupil's Vocabulary.—The diagnostic procedure involved the presentation of 500 stimulus words in mimeographed form to each pupil. These 500 stimulus words were carefully selected, and represented what was believed to be a good "scatter" over the fields of the pupils' experiences. Fifty words were presented each day for a period of ten days. Five spaces were provided after each stimulus word for the pupil to write his responses. The pupil was told to write all the

words that the stimulus word made him think of. The pupil was also told that this was a test to find out how many words he knew, and that nothing would be "taken off" for misspellings so long as the words he wrote could be read. Approximately eighteen minutes were allowed for writing responses to each list of fifty.

The eighteen minutes proved to be sufficiently long for practically all of the pupils. Most of them had finished writing before the time was up, although many of them failed to fill in all of the spaces provided for responses. When urged to write more, the pupil's usual plea was that he couldn't "think of any more words." There was a spirit of competition in the tests, and somewhat of haste, especially near the beginning of the tests.

A tabulation of the response words of each pupil was made. From this tabulation it was possible to derive the following:

1. A measure of the *richness* of the pupil's vocabulary (total number of different words used).

2. A measure of the *readiness* of the pupil's vocabulary (total number of words used).

3. An individual list of misspelled words.

Teaching the Individual Word-Lists.—The individual lists of misspelled words were then presented for study and drill. The teacher was instructed to use only the regular spelling time for this purpose, and to use any of her usual methods and devices to help the pupils to master the spelling of their individual lists. The period of study and drill on the individual list covered two weeks.

Checking Results.—During the time that the lists of stimulus words were being presented, and previous to the beginning of study on the individual word lists, three "themes" were collected from each pupil. These themes were a part of the regular English work of the pupils. Hereafter in this report these three themes will be referred to as "the first set of themes."

After the close of the period of study of the individual word lists, three themes were again collected from each pupil. As before, these themes were part of the regular English work of the pupils, who remained wholly unaware that their written compositions were to be seen by any one other than their teachers.

In the case of each set of themes individual tabulations were made. From these tabulations the following were derived:

1. A measure of vocabulary *richness* (total number of words used).
2. A measure of vocabulary readiness (total number of words used.)
3. Number of words misspelled.

The results in terms of percentages of words misspelled are given in Table I. It needs to be remembered that the "first set of themes" was written by the pupil before the program of individual improvement was begun. The "second set of themes" was written by the pupil within a week after the two-weeks period of study of the individual word-lists was finished. The percentages of spelling errors made by the pupils in writing the response words is given for purposes of comparison only.

TABLE I

PERCENTAGE OF WORDS MISSPELLED BY 104 LOW-SEVENTH GRADE PUPILS (1) IN THEIR RESPONSES TO 500 STIMULUS WORDS; (2) IN THE "FIRST SET OF (THREE) THEMES;" (3) IN THE "SECOND SET OF (THREE) THEMES;" RANGE OF PERCENTAGE OF ERROR, MEAN PERCENTAGE OF ERROR; MEDIAN PERCENTAGE OF ERROR; PERCENTAGE OF ERROR AT THE 25TH PERCENTILE; PERCENTAGE OF ERROR AT THE 75TH PERCENTILE

Kind of written work	Percentage of Spelling Errors				
	range	mean	median	25th percentile	75th percentile
Response words	0.3% to 62%	16.3%	11.2%	5.4%	25.0%
First set of Themes	0.4% to 13.9%	4.5%	3.9%	2.6%	5.1%
Second set of Themes	0.0% to 8.0%	2.4%	2.0%	0.0%	4.0%

The smaller percentages of misspelled words in the second set of themes is made obvious by the figures of Table I. Both the mean and median percentages of error in the first set of themes are reduced almost half in the second set of themes.

The Meaning of this Improvement in Spelling.—The results in terms of fewer misspellings in written compositions, as indicated in Table I are, of course, rather gratifying. However, there are at least two questions which may be asked about these results. The first question concerns whether the apparent improvement in spelling is real; the second question is whether or not the improvement, if real, will be lasting.

The answer to the first of these questions requires some explanation. There are at least two ways of improving the spelling of pupils in their written composition. One way, though not a desirable one, is so to emphasize correct spelling that the pupil will write only such words as he feels sure he can spell correctly. Thus the spelling errors of pupils in

their themes might be reduced to zero, without improving in the least their abilities to spell.

The tendency of pupils under demands for correct spelling to select their words is well illustrated by the junior high school boy who, in writing a letter home while on his vacation, wrote as follows:

"While in Spokane, Harold and I bought one of those things the people play out in those islands where Ben Gordon used to live."

Certainly the words ukelele and Hawaii are peculiarly difficult of spelling, and quite possibly had no just claim upon the boy's ability. But the method of avoiding a misspelling herewith illustrated is a common method among school children when writing themes.

This fact is borne out by the figures given above. Notice the percentages of spelling errors in the responses to the stimulus words. The children in writing these responses were told that nothing would be "taken off for misspellings." Therefore, they let themselves go. The high percentage of error in spelling was partly due, no doubt, to carelessness and haste. But not entirely. Many errors were due to the use of words which *ordinarily would not appear in their written compositions,* because of their tendency to select for use in their theme-writing only words which they think they can spell.

The writers attempted to check this matter by dividing the number of *different* words used by the total number of words used. The ratios obtained by this method are shown in Table II.

TABLE II

RATIO OF NUMBER OF DIFFERENT WORDS TO TOTAL NUMBER OF WORDS USED BY 104 LOW-SEVENTH GRADE PUPILS IN RESPONSES TO 500 STIMULUS WORDS, IN THE FIRST SET OF (THREE) THEMES, AND IN THE SECOND SET OF (THREE) THEMES, RESPECTIVELY

Kind of written work	Ratio of number of *different* words used to total number of words used				
	range	mean	median	25th percentile	75th percentile
Responses to Stimulus Words	20% to 56%	44%	43%	39%	49%
First set of Themes	25% to 48%	36%	35%	32%	40%
Second set of Themes	27% to 54%	43%	42%	38%	47%

As shown in Table II, the ratios which reveal the relative "richness" of the pupil vocabularies are highest in the responses to the stimulus words, and lowest in the first set of themes. The ratios in the second set of themes hold an intermediate position. It may be questionable whether comparison between the ratios derived from the responses to the stimulus

words can be valid. In the case of every pupil, the number of response words greatly outnumbered the words used in either set of themes. This fact would tend to bring the ratios of Table II down rather than up. However, ratio comparisons between the two sets of themes can hardly be objectionable. If we take a relatively small ratio (between *different* words used and *total* words used) as an indication of selectiveness on the part of the pupil in his choice of words, then it appears that such selectiveness operated on both sets of themes to a greater extent in the responses to stimulus words. However, this selectiveness operated to a smaller extent in the second set of themes than it did in the first set of themes. In view of this fact, it appears that the improvement in spelling shown in the second set of themes was *real*, and not due merely to an increase in word-selectiveness on the part of the pupils.

Will the Improvement Be Lasting?—One might in part answer this question with another question: "Do pupils ever forget?" The writers believe that the improvement shown by the pupils as a result of this method of approach, will be in a fair measure permanent. This does not mean, however, that the spelling of these same pupils in their written compositions will hereafter remain at the relatively high level of accuracy shown in the second set of themes.

Two factors will serve with time to increase the percentage of spelling errors made by these pupils in their written compositions. One of these factors has already been mentioned; namely, the tendency of children to forget. Because of this factor the individual list of misspelled words derived from the responses to the stimulus words, should be preserved for occasional review by the pupil.

The second factor is a more significant one, however, from the standpoint of both pupil and teacher. This factor grows out of the fact that the active vocabularies of these children are constantly growing. Almost daily they are learning new words—and what is of greater importance, they are learning to use new words. Words that they had no need to spell yesterday appear as misspellings in the compositions handed in today. In a few weeks, or at most, in a few months, the 104 active vocabularies diagnosed in this study will contain hundreds of new words, many of which will present spelling difficulties.

To meet this seemingly never-ending problem of spelling improvement, frequent diagnoses of individual pupils are not only highly desirable, but virtually necessary if spelling instruction is to be efficient and

effective. The writers believe that some such diagnostic procedure as indicated in this report should be followed as a regular practice in the elementary and junior high schools at intervals of not less than one year, nor greater than two years, apart.

The list of 500 stimulus words if well selected is probably sufficient, at least up to the junior high school age. Beyond the sixth grade the number might be increased to 750 or even 1000. The greater the number of stimulus words used, the greater the number of responses; therefore, the more searching the diagnosis. This procedure, if carried out, should supplement the regular spelling instruction, and not in any way supplant it, although the regular spelling time might well be used, as in the present study, for the diagnostic procedures.

A COMPARISON OF TWO METHODS OF TEACHING HIGH SCHOOL ALGEBRA

RICHARD DRAKE
University High School, University of Minnesota

DURING the year 1932-1933 a study was carried out in the University of Minnesota High School to compare the achievement of pupils under two methods of instruction. The types of instruction used were what is commonly termed an individual method, and an individualized group method. The pupils comprising the groups were two ninth-grade algebra classes. It is the purpose of this paper to report on certain aspects of the study that may be of general interest.

The pupils in the two groups were matched according to: (1) intelligence quotient,[1] (2) achievement during the first five weeks of school under the same method of instruction, (3) results on a survey test,[2] (4) arithmetic achievements,[3] and (5) chronological age. It will be seen from Table I that the two groups were quite closely matched. Twenty-two pairs were obtained.

TABLE I

MEANS OF THE BASES FOR PAIRING

Bases	Group Method	Individual Method	G—I
Achievement	75.4 ± 13.7	74.3 ± 13.8	1.1
I. Q.	118.7 ± 12.0	120.3 ± 12.5	−1.6
Survey Test	32.8 ± 12.0	31.9 ± 13.0	0.9
Arithmetic	52.3 ± 8.3	51.6 ± 7.6	0.7
C. A.	14−1 ± 0−7.7	14−2 ± 0−7.2	0−1

In the group taught by the individual method of instruction the students were allowed to proceed at their own rate. The text[4] was divided into units and these into sub-units each covering approximately one week's work. When a student completed a sub-unit, he was given a practice test over the work. He corrected this test himself and received re-

[1] The average of five standard intelligence tests.

[2] Breslich, E. R. *Algebra Survey Test, First Semester—Form B.* Bloomington, Illinois: Public School Publishing Company.

[3] Kelley, T. L., Ruch, G. M., and Terman, L. M. *New Stanford Achievement Tests, Advanced Examination.*

[4] Stone, J. C. *First Year Algebra.* New York: Sanborn and Company, 1932.

medial help from the teacher if this was necessary. He then handed in his practice test and received a copy of the regular test which was corrected by the teacher. When he completed a unit, he was given a test over it. Only one form of the unit test was employed.

The students were encouraged to attempt to work out their own difficulties. Each student did only as many problems as he felt to be necessary in order to understand the work. The teacher spent his time during the class period explaining errors on tests taken the previous day, helping students who were having difficulty with new work, and suggesting and explaining remedial work when necessary.

The pupils taught by the group method used the same text and tests as the section described above. At the beginning of a sub-unit an assignment was made for the group with a date set at which it was to be completed. This assignment consisted of maximum, medium, and minimum levels as determined by the authors of the text in their teacher's manual.[5] The new work was explained to the group as a whole at the beginning of a sub-unit and at such times during the assignment period as was convenient. Part of each class period was spent in explaining difficulties which seemed to be common to the group. The remaining time was spent in supervised study. The first form of the sub-unit test was given as a practice test on the day preceding the date the assignment was due. This was corrected in class and explained. The students then worked problems similar to those they had missed. All practice material was handed in the day the regular test was taken. Under this method of instruction the pupils progressed at their own rate within a sub-unit but were all brought together at the end of the assignment period.

In Table II the results of the tests given at intervals during the year are compared. The difference of the means was in favor of the group method of instruction in all three cases and became increasingly larger as the length of time increased. The significance of the difference of the means was determined by using "Student's"[6] formula and also by the use of Lindquist's[7] formula.

---

[5] Stone, J. C., and Mallory, V. S. *Stone's First Year Algebra Manual for Teachers.* New York: Sanborn and Company, 1930.

[6] Ezekiel, Mordicai, "Student's Method for Measuring the Significance of a Difference between Matched Groups," *Journal of Educational Psychology*, XXIII (September, 1932), pp. 446-50.

[7] Lindquist, E. F., "The Significance of a Difference between Matched Groups," *Journal of Educational Psychology*, XXII (March, 1931), pp. 197-204.

TABLE II

COMPARISON OF RESULTS ON TESTS GIVEN AT INTERVALS DURING THE YEAR

		First Quarter Final	Second Form Survey Test	Second Quarter Final
No. Weeks work covered by Test		12	18	24
Means for Group Method		49.73 ± 14.12	68.00 ± 17.84	64.73 ± 18.00
Means for Individual Method		45.64 ± 9.98	59.82 ± 12.48	56.41 ± 11.93
Difference of Means		4.09	8.18	8.32
Chances in 1000	("Student's")	917	996	992
	(Lindquist's)	919	985	990

The second group of tests used for comparing the achievement of these two groups consisted of two parts and comprised those tests which included the entire year's work. The 1933 Minnesota State Department Examination was given without previous notice five weeks before the end of the school year.

The final examination was divided into two parts. One part was made up of what might be termed the minimum essentials in a course in elementary algebra. The test was composed principally of material from the first five units. The second part of this examination consisted of more difficult problems such as would be included in the medium and maximum levels of achievement.

A comparison of the means on these three tests is found in Table III. The students taught by the group method excelled those taught by the individual method in all three tests, the difference being greater on the State Examination and on the second part of the final than on the first part of the final. These differences were all statistically significant.

TABLE III

COMPARISON OF MEANS OF TESTS OVER THE YEAR'S WORK

		State Board (1933)	Final Part 1	Final Part 2
Group Method		73.45 ± 33.23	51.86 ± 8.30	37.45 ± 12.54
Individual Method		53.91 ± 25.30	45.15 ± 9.20	25.82 ± 16.41
Difference		19.54	6.71	11.63
Chances in 1000	("Student's")	999	1000	996
	(Lindquist's)	1000	998	998

The argument has been advanced that individual instruction is more favorable to the pupil of higher ability than is the group method. For this reason the test scores of the students in the upper quartile of intelligence in the two groups were compared. The results, as tabulated in

Table IV, show an advantage on all six tests for the students of higher ability in the group method of instruction. Because of the small number of cases involved, it would be impractical to attempt to determine the statistical significance of these differences.

TABLE IV

MEANS OF SCORES MADE BY STUDENTS IN UPPER QUARTILE ON INTELLIGENCE

	Group Method	Individual Method	G—I	Reliability Chances in 100
1st. Quarter Final	60.8	55.6	5.2	69
2nd. Form Survey	87.8	77.6	10.2	98
2nd. Quarter Final	78.4	73.0	5.4	70
State Board	104.6	85.4	19.2	85
Final Part 1	58.2	55.8	2.4	53
Final Part 2	46.0	44.2	1.8	22
Intelligence Quotient	137.8	138.6	− 0.8	

When this same procedure was applied to the results from pupils in the lower quartile of intelligence, a similar difference was found in each instance in favor of the group method. (See Table V.)

TABLE V

MEANS OF SCORES MADE BY STUDENTS IN LOWER QUARTILE ON INTELLIGENCE

	Group Method	Individual Method	G—I	Reliability Chances in 100
1st. Quarter Final	49.8	48.4	1.4	16
2nd. Form Survey	62.4	51.6	10.8	82
2nd. Quarter Final	62.8	54.2	8.6	79
State Board	71.8	44.2	27.6	81
Final Part 1	51.4	43.2	8.2	76
Final Part 2	31.6	19.8	11.8	22
Intelligence Quotient	106.8	106.4	0.4	

There are certain definite limitations and errors in an experiment such as this which can be neither measured nor controlled. These are in most cases intangible factors for which there have been developed no reliable measuring instruments. Briefly they are:

1. Students in a school such as the University High School do not present a typical high-school population.

2. Certain techniques in teaching might be more suitable to one teacher than to another.
3. The fact that only a small number of cases were obtainable for the problem would limit the extent to which the conclusions could be generalized.
4. There are factors other than achievement that have not been measured and which might show an advantage for one method or the other. Among these factors would be included study habits, retention, and future success in related courses.

Under the conditions described in this experiment the following specific conclusions can be made:

1. Students with superior ability attain a higher standard of achievement under the group method of instruction than do like students under the individual method.
2. Students with low ability achieve better when taught by the group method than do similar students taught by the individual method.
3. Both methods require about the same amount of time from the pupils in preparation outside of class.
4. Slower progress is made by the pupils taught under the individual method than by those taught under the group method.
5. Pupils in the section taught by the group method of instruction achieve consistently higher on tests given throughout the year as well as on tests given at the end of the year.

Owing to the number of factors beyond the control of the experiment and the limited number of cases, it is ostensibly impossible to generalize the above conclusions. If in a large number of experiments of the same nature the outcomes were similar to those of the present study, one could with reasonable safety state that group instruction is superior to individual instruction for pupils, whether above or below average in intelligence, and that by the group method pupils make more rapid progress with an equal expenditure of time.

THE EFFECTS OF PREMATURE DRILL IN THIRD-GRADE ARITHMETIC

WILLIAM A. BROWNELL
Duke University
and
CHARLOTTE B. CHAZAL
Ocala Public Schools, Florida

WHATEVER other connotations the word possesses, "drill" as used in this paper refers to those activities on the part of the teacher which are designed to set up comparatively unvaried practice on the part of the pupil. Drill in the case of the number combinations consists in those teacher-procedures through which the pupil is led to say the appropriate verbal formulas, or to read or to write the corresponding symbols, over and over again without significant change. In the case of computation (as in column addition with whole numbers) drill comprises whatever means the teacher adopts to get the pupil to perform relatively the same operations time after time. As here defined, then, drill relies upon repetition for its effect upon learning.

CRITICAL REVIEW OF PREVIOUS INVESTIGATION ON THE EFFECTS OF DRILL

Research on the effects of drill is now by no means as popular as it was at one time. Experimental interest in the problem began with Thorndike's 1908 study (1)[1], reached its peak in the period 1910 to 1920, and has now considerably subsided. In more recent years the large number of investigations on drill have been less concerned with its effects upon learning than with such related matters as the length of the drill period, the comparative merits of mixed and isolated drill organization, and the like. It is as if the instructional value of drill had been firmly established and now the major problem is how the drill should be administered.

There would seem to be in the experimental literature abundant justification for belief in the vital importance of drill in arithmetic instruction. Without exception investigators have reported that drill, of whatever sort and however administered, improves efficiency. From the outset the consistency of the experimental data has, as it were, blocked off any

[1] The numbers in parenthesis refer to the bibliography at the end of the article, in which the experimental investigations cited are arranged in chronological order.

tendency to question the findings themselves or their meaning for the teaching of arithmetic. On the contrary, the completeness with which they have been accepted is to be seen in the conspicuous place accorded drill in current thought and in school practice. Advertisements of new texts carefully mention the scrupulous attention given the matter of drill provisions. Commissions charged with the selection of text series weigh heavily the success or failure with which competing authors have allotted and distributed drill according to stated criteria. Practice pads and workbooks continue to appear, oftentimes without correlation with textbook development or recommended instructional procedures of their own. All of this clearly involves the assumption that drill is the essential thing. In many a classroom instruction in arithmetic has become virtually synonymous with the administration of drill.

In view of these facts any skepticism concerning the instructional significance of the research on the effects of drill seems almost to constitute an impertinence. Nevertheless, in 1924, Buswell and Judd (20), on page 107 of their "Summary," had the following to say:

"One gets the impression from the reports of the experiments with drill that the investigators have been more concerned with what could be done under specific conditions than with determining the place of drill in the total program of teaching arithmetic."

Now, this sentence is as true in 1935 as it was eleven years ago. To it may be added a second sentence equally skeptical: that while the experimenters may themselves have been concerned with the results of drill in particular circumstances, the implications of their findings have been by no means restricted to circumstances which corresponded with those of their investigations.

At the time this paper was written, sixteen of the nineteen experimental reports on the effects of drill were available for first-hand inspection. These were examined with regard to two important points, namely, (1) the school grades in which the studies were made, and (2) the measures obtained.

(1.) *Grades in which studies were made.*—Of the sixteen investigations referred to above, nine (1, 2, 3, 4, 7, 11, 13, 16, 18) were made in grade V and above,[2] three of them with high-school graduates (1, 2, 4).

[2] An investigation is here classified on the basis of the lowest grade used. Thus, if an investigation was made in grades IV, V, VI, and VII, it is here assigned to the fourth-grade group only.

Four of the remaining seven were made in grade IV (5, 6, 8, 14). The other three (15, 17, 19), made in grade III, were conducted some weeks or months after instruction in the skills upon which drill was given. In all sixteen experiments, therefore, drill followed initial instruction by varying margins—from some weeks to more than ten years.[3] In none of the experiments was a test made of the value of drill as an early step in teaching—as a means of promoting understanding and supplying meaning for that which was to be practiced. On the contrary, the problems of these experiments related to the effectiveness of drill for *improving, fixing, maintaining,* and *rehabilitating* skills which had already been assured by prior instruction. No matter how unmistakably the experiments reveal these virtues in drill, therefore, they do not at all justify many current practices in introducing arithmetic skills and facts—that is, of course, if it be granted that these skills and facts should be intelligible to children.

(2.) *Measures obtained.*—Next the reports were examined with regard to the measures used in these experiments. Invariably these measures have been measures of time, of accuracy, or of both time and accuracy. They are, therefore, measures of *efficiency*: they tell *how well* one performs, but not *how* one performs. The distinction is no mere verbal quibble. Suppose that Johnnie is required to give the sum of 5 and 4. Suppose further that he obtains his answer by thinking, "5, 6, 7, 8, 9." In the typical experiment, records are made of his time (let us say .6 second) and of the correctness of his answer. The fact that he counted to get the sum is disregarded. Suppose now that George secures the same answer of 9 for the combination in the same length of time (.6 second), but that he does so by thinking "5 and 5 are 10, so this is 9." The experimental records for George are identical with those for Johnnie. It is true that Johnnie and George are equal in efficiency, but they are by no means equal in level of performance. Johnnie is a counter; George is capable of a much more advanced type of quantitative thinking. His level of performance is distinctly higher than is Johnnie's.

Now, if growth in arithmetic is conceived to be the development of

[3] The experimental reports which were not available were: 9, 10, and 12. Insofar as these studies are reviewed in the Buswell-Judd "Summary" their general nature agrees with that described for the sixteen available studies. Thus, numbers 10 and 12 were both made in grade V.

expert quantitative thinking,[4] then instructional procedures must be evaluated in terms of children's thought processes. It follows too that measures of performance level are better indexes of arithmetical development than are measures of efficiency. Nevertheless, these measures of performance level have been neglected[5] in the experiments on the effects of drill. It may be conceded that drill increases, fixes, maintains and rehabilitates efficiency. Even so, a more important question remains unanswered—"What contribution, if any, does drill make to raising the level of children's performance in arithmetic, to promoting growth in mature forms of quantitative thinking?" The remainder of this paper is devoted to a brief report of a study which was undertaken expressly to secure at least a partial answer to this question.[6]

THE INVESTIGATION

In the fall of 1932, 63 children entered grade III of the school in which the investigation was conducted. In the two preceding grades these children had been taught the 200 combinations in addition and subtraction through drill. After instruction in counting, the combinations were exposed, a few in each lesson, in random order. A combination, such as $5 + 3$, was exhibited, and the answer 8 was supplied by the teacher or by some child who knew it. Individual and group practice followed, in the form of oral, silent, and written exercises—flashcards, games, and the common rapid-exposure devices being employed with a view to establishing mastery over the combinations. If, at a later time, a child did not know a sum or remainder, he was not allowed to find it for himself. Instead, the answer was immediately provided. "Learning" consisted in the repetition of the appropriate verbal formulas. Simple one-step problems then provided use of the combinations so taught.

[4] It is possible, of course, to entertain quite a different conception of growth in arithmetic. One may, for example, regard arithmetical growth as the accumulation of independent and comparatively unrelated facts and skills. If one holds this latter view of arithmetic (and it seems to be the popular view at present) then the data to be presented here will appear to be of slight consequence, and the arguments to be advanced will appear to be wholly irrelevant.

[5] There is a suggestion of other measures in Smith's study (11). Smith secured some few data on types of errors in computation.

[6] The investigation was made by Miss Charlotte B. Chazal, a graduate student at Duke University, and credit for the data properly belongs to her. A more complete report will be found in her unpublished A.M. thesis bearing the same title as this article, in the Duke University Library, Durham, North Carolina. The thesis is dated 1935.

Outline of the procedure.—Ten days after the children came into grade III, a written test on the 100 addition combinations was given. This test, which will be called Test A, was a group test. The children were urged to be careful to write only correct answers, and were timed to the nearest quarter-minute. Immediately after Test A interviews were held individually with 32 children selected on the basis of their showing on Test A: the nine making the poorest scores, thirteen making average scores, and the ten making the highest scores. Each child was directed to "think out loud" in connection with each of sixteen addition combinations, the ten hardest on Test A and six of average difficulty. This series of interviews will be referred to as Interview I.

Throughout the month which followed (twenty school days) five minutes were taken from the daily arithmetic period for further drill on the addition combinations,[7] so distributed that each combination was presented a total of at least 40 times. At the end of the month the group test on the addition combinations was re-administered as Test B, and Interview II was held with the same 32 children on the same sixteen combinations as were used in Interview I.

Then followed a month in which no special drill was given on the combinations. Finally came Test C and Interview III.

Group test data.—What do the data reveal with regard to the effects of drill? First of all, the data for the written tests (Group Tests A, B, and C) may be examined. On Test A the median time required was seventeen minutes, and the median number of errors was eleven. Both time and errors are excessively high. Even with allowances for the expected influence of the summer's vacation and for the influence from special emphasis on accuracy in the test, the evidence is that drill in grades I and II had hardly succeeded in developing mastery of the combinations.

On Test B, after a month of drill, the median time was lowered from seventeen to eleven minutes, and the median number of errors, from

[7] It is impossible here to give the details of the variations in materials and procedures involved in the drill. It must suffice to say that these materials and procedures were selected with a view to emphasizing *repetition* as the method of learning. The repetitions were silent, written, and oral. The presentations were group and individual, by means of flashcards containing the facts without the answers. The answers were on the reverse of the cards. They were thus accessible to the pupil in individual drill. They were supplied as needed in group drill. The pupils were encouraged always to think, write, or say the sums immediately upon presentation of the facts. They were to establish associations between the facts and the sums by memorizing the verbal formulas.

eleven to four. On Test C, however, after a month without drill, the median time was still further reduced to seven minutes, while the median number of errors remained four, the same as on Test B.

Altogether, it is fair to say that the drill on the combinations in grade III produced results which correspond closely with those reported in the experiments which have been canvassed. It increased *efficiency* as measured in the usual manner: the children after drill could give correct answers to more combinations in less time than before drill. But what about *level of performance*? Did the drill on the combinations make any contribution to improved ways of thinking of the combinations? The interview data contain the answer to this question.

Interview data: categories.—The variety of ways in which a child may secure the sum of an addition combination is very great. For the purposes of this report these many methods have been classified into four major types: "counting," "indirect solution," "guessing," and "immediate recall." A child was said to "count" the combination 3 +4 if he said, "1, 2, 3, . . 7," or "3, 4, 5, 6, 7," or if in any other way he dealt with combination, or with either number therein, as so many *ones*. He was said to employ "indirect solution" if he secured his sum for 3 + 4 by saying, "3 and 3 are 6, and this is one more," or "4 and 4 are 8, and this is one less," or "4 and 2 are 6 and 1 is 7," or in any other way made use of smaller numbers as groups. He was said to "guess" if at once upon seeing a combination he announced an incorrect sum and made no attempt to correct it, or, if he did, made still another mistake. He was said to employ "immediate recall" if his response was correctly announced without hesitation.[8]

Data from Interview I.—The data obtained in Interview I consist of the responses of 32 children to sixteen combinations, a total of 512 responses classified according to the four categories just described. They reveal, as no other type of data could, the children's level of performance at the beginning of the term—after two years of drill on the combinations in grades I and II. Of the 512 combinations 22.2 percent were counted; 14.1 percent were indirectly solved; 23.8 percent were guessed; and only 39.5 percent were *known as combinations are supposed to be known* when

[8] It is apparent that the distinction between "guessing" and "immediate recall" is one which resisted reliable classification. Undoubtedly credit was many times given for "immediate recall" when actually the children had "guessed" luckily. This limitation in the technique is freely admitted—the more so since the errors arising therefrom are favorable rather than detrimental to a respectable showing for drill.

taught by drill. (See columns 2 and 5 in Table I.) No one can estimate how many times each of these sixteen combinations had been presented for repetition in grades I and II, but the number must have been very large. Each time one of them was presented, it was expected that the children, upon seeing it or hearing it, would immediately think the sum, and *only the sum*. Such is the assumption underlying the drill procedure —through repetition to associate a given response (as 7) with a given stimulus (as 3 + 4). And yet, in spite of the great amount of practice

TABLE I

FREQUENCY AND PERCENT OF FOUR TYPES OF METHOD USED ON INTERVIEWS

Method (1)	Frequency by Interview			Percent by Interview		
	Int. I (2)	Int. II (3)	Int. III (4)	Int. I (5)	Int. II (6)	Int. III (7)
Counting	116	89	99	22.7%	17.4%	19.3%
Indirect Solution	72	80	65	14.1	15.6	12.7
Guessing	122	93	79	23.8	18.2	15.4
Immediate Recall	202	250	269	39.5	48.5	52.5
Total	512	512	512	100.1%	99.7%	99.9%

in the first two grades, deliberately designed to provide, even to *require*, repetition, at the beginning of grade III only two out of five of these combinations were dealt with in this manner. It is something of a strain on one's credulity to believe that the low level of performance revealed by Interview I was due to vacation losses. It is much more reasonable to believe that drill in the two preceding grades had missed its mark: it had failed to set up the purposed associations, and it left the pupils equipped with the most immature ways of thinking of numbers.

Data from Interview II.—Regardless of the validity of this charge against drill as it applies to the instruction given the two years before in grades I and II, data are at hand from Interview II to test its effectiveness in grade III. Did the month of special drill appreciably raise the level of performance? Counting was found to persist to the extent of 17.4 percent of the total of 512 responses—a reduction of only 5.3 points in percentage. (Columns 2 and 6, Table I.) There was a slight increase in indirect solution, from 14.1 percent to 15.6 percent. Guessing was reduced from 23.8 percent to 18.2 percent; and immediate recall increased 9.2 points, to make 48.8 percent, nearly half, of the total. Part of the gain in immediate recall can probably be ascribed to the restoration of

associations which had "grown rusty" during the summer. Nevertheless, even if one concedes to drill all of the gain made in the month, still its showing is scarcely creditable. Altogether, only 48 more combinations were known as such after drill than before, and counting and guessing combined still contributed more than 70 percent as many responses as did immediate recall.

One should now place these interview data with respect to performance level alongside the efficiency measures obtained in Group Tests A and B. On the group tests there was substantial evidence of the effectiveness of drill—drill improved efficiency. The interview data explain the nature of the improvement: the time and accuracy scores on Test B were better than on Test A, not because the month's drill had materially raised the level of the pupils' performance, not because drill had supplied more mature methods of thinking of the combinations, but because the old methods were, on the second occasion, employed with greater proficiency. The children who on Test A counted, still counted on Test B, but counted more expertly. Those who on Test A relied on indirect solutions made surer use of these methods on Test B, and so on. The month's drill made little contribution to growth in mature forms of quantitative thinking.

Data from Interview III.—The data on Interview III (Columns 4 and 7, Table I) were obtained, it will be recalled, after a month without drill. At that time the children on the average counted two more combinations per hundred than they did at the time of Interview II; they solved approximately three less per hundred and also guessed about three less per hundred; and they recalled immediately nearly four more per hundred. Progress toward automatized associations came therefore at the expense of indirect solution and guessing, though this improvement in performance level was in part balanced by a slight retrogression toward counting.

These measures in Interview III were originally collected to test the degree to which improvement in level of performance effected through drill would persist after cessation of drill. It is not at all clear that they serve this purpose. Whether the gain in known combinations was due to some delayed effect of drill or was due to the elimination of drill and to the introduction of many more kinds of arithmetical experiences, it cannot be said. One explanation is as good as the other. Accordingly, the data are presented only for whatever they may be worth.

Other presentations of interview data.—Thus far, the children's processes have been bulked together regardless of the combinations with which they were used. Chart I represents the situation in a different way. It traces the responses made by given children with particular combinations through the two months of the investigation. Thus, 116 of the 512 combinations were counted on Interview I. One month later, after drill, 69 of the 116 were still counted by the same children who counted them on Interview I; 16 of the 116 were solved, and so on. On Interview III, of the 69 of the original 116 counted combinations, 60 were still being counted, 1 was solved, etc. The form of the chart itself graphically reveals the facts better than they can be expressed in language. Close examination of the chart will serve to support the statements made already with respect to the effects of drill on performance level. This is, of course, inevitable, for the data assembled in Chart I are the same basically as those presented in a different form in Table I.

One last type of record pictures the effects of drill in the case of four selected children. Space permits only an explanation of the manner in which the charts are to be read. Chart II shows what happened in the case of a counter. Her methods with the 16 combinations at the time of Interview I appear in the second column. Her responses to the same combinations on Interviews II and III follow in the last two columns. At the upper right-hand corner are entered her time and accuracy scores on the three group tests, A, B, and C. The record for this girl shows that drill only made her a more efficient counter. (The phrase "Same (17)" in the first line of the chart means that the girl secured her sum (17, in this case) by the same procedure as that used in the interview immediately preceding.)

Chart III illustrates the persistence of indirect solution in spite of drill designed to stop it. Chart IV shows the slight effects of drill upon a child who could get her sums only by guessing. Chart V is that of a child who already knew the combinations when he entered the first grade.

It is unfortunate that these charts cannot be here made the objects of detailed interpretation; they would well repay the space required. No other data which have been presented reveal so clearly the inadequacy of drill as a means of improving quantitative thinking. Since space limitations forbid, this detailed study can only be commended to the reader to make for himself.

CONCLUSION

To summarize, the data collected in this investigation seem to warrant several inferences. First, drill, as it was administered in this study, does not guarantee that children will be able immediately to recall combinations as such. The reason lies in the fact that drill as given by the teachers does not necessarily lead to repetition on the part of pupils. Second, in spite of long-continued drill children tend to maintain the use of whatever procedures they have found to satisfy their number needs. Third, drill makes little, if any, contribution to growth in quantitative thinking by supplying maturer ways of dealing with numbers.

The statement of these conclusions in no way implies that drill has no place in arithmetic. The contrary is the fact: drill is exceedingly valuable for increasing, fixing, maintaining, and rehabilitating efficiency[9] otherwise developed. Nevertheless, these conclusions do particularize the things which drill will *not* do. To be more effective[9] drill must be preceded by sound instruction. This fact, obvious enough upon second thought, should lead to a change in research interest in arithmetic. It should encourage the more vigorous study of the problems of learning and of initial instruction, even if this change in interest should lessen somewhat the extraordinary attention now given to drill. Learning, *not drill*, is the important question in arithmetic.

BIBLIOGRAPHY

(There are many other studies on drill than those cited here. Reports have not been included when the effect of drill on learning has been a minor consideration to the investigator. Thus, studies dealing especially with the length of the drill period, with the distribution of drill periods, etc., have been omitted.)

1. Thorndike, Edward L. "The Effect of Practice in the Case of a Purely Intellectual Function," *American Journal of Psychology*, XIX (July, 1908), pp. 374-84.
2. Thorndike, Edward L. "Practice in the Case of Addition," *American Journal of Psychology*, XXI (July, 1910), pp. 483-86.

[9] That is, of course, on the assumption again that children shall see sense in what they learn. It all depends upon one's conception of arithmetic ability. If the pupil knows arithmetic when he has a memoriter mastery of hundreds of isolated facts, then perhaps he had best learn those facts by brute memorization. If, on the other hand, he knows arithmetic only when he can *use* intelligently what he has learned, then he had best make use of his intelligence in learning the facts. In the light of the former conception, drill (repetition) is adequate for instruction. In the light of the latter conception, drill (repetition) is grossly inadequate. The nature of its shortcomings has been outlined above.

3. Brown, Joseph C. "An Investigation on the Value of Drill Work in the Fundamental Operations of Arithmetic," *Journal of Educational Psychology*, II (February, 1911), pp. 81-88; III (November and December, 1912), pp. 485-92, 561-70.
4. Wells, Frederic Lyman. "The Relation of Practice to Individual Differences, *American Journal of Psychology*, XXIII (January, 1912), pp. 75-88.
5. Donovan, M. E., and Thorndike, Edward L. "Improvement in a Practice Experiment under School Conditions," *American Journal of Psychology*, XXIV (July, 1913), pp. 426-28.
6. Kirby, Thomas Joseph. *Practice in the Case of School Children*. Teachers' College Contributions to Education, No. 58 (New York: Teachers' College, Columbia University, 1913), vi + 98 pp.
7. Phillips, Frank M. "Value of Daily Drill in Arithmetic," *Journal of Educational Psychology*, IV (March, 1913), pp. 159-63.
8. Hahn, H. H., and Thorndike, E. L. "Some Results of Practice in Addition under School Conditions," *Journal of Educational Psychology*, V (February, 1914), pp. 65-84.
9. *The Courtis Standard Tests in Boston, 1912-1915: An Appraisal*. Document No. 15, 1916; Bulletin No. X of the Department of Educational Investigation and Measurement (Boston: Boston Printing Department, 1916), 48 pp.
10. Kerr, Mary A. "Effects of Six Weeks Daily Drill in Arithmetic," *Studies in Arithmetic*. Indiana University Studies, No. 32 (Bloomington, Indiana: Indiana University, 1916), pp. 79-95.
11. Smith, James Henry. "Individual Variations in Arithmetic," *Elementary School Journal*, XVII (November, 1916), pp. 195-200.
12. Wimmer, Herman. "Experimental Study of the Effects of Drill in Arithmetical Processes under Varying Conditions," *Studies in Arithmetic*. Indiana University Studies, No. 32 (Bloomington, Indiana: Indiana University, 1916), pp. 96-102.
13. Evans, J. E., and Knoche, Florence E. "The Effects of Special Drill in Arithmetic as Measured by the Woody and the Courtis Arithmetic Tests," *Journal of Educational Psychology*, X (May-June, 1919), pp. 263-76.
14. Phillips, Frank M. "Relation of Initial Ability to the Extent of Improvement in Certain Mathematical Traits," *Pedagogical Seminary*, XXVI (December, 1919), pp. 330-55.
15. Hoover, J. H. "Motivated Drill in Third-Grade Arithmetic and Silent Reading," *Journal of Educational Research*, IV (October, 1921), pp. 200-211.
16. Newcomb, R. S. "Effective Drill Exercises in Arithmetic," *Journal of Educational Psychology*, XVI (February, 1925), pp. 127-31.

17. Burton, Cassie B. "Results of Definite Drill in the Four Fundamental Processes as Shown by the Woody-McCall Mixed Fundamentals." In *Studies in the Elementary School Principalship.* Fifth Yearbook of the Department of Elementary School Principals (Washington: Department of Elementary School Principals of the N. E. A., 1926), pp. 323-28.

18. Weerdt, Esther H. "The Permanence of Improvement of Fifth-Grade School Children in Certain Mental Functions," *Journal of Educational Research,* XVI (September, 1927), pp. 127-31.

19. Immaculata, Sister M. *Permanence of Improvement and the Distribution of Learning in Addition and Subtraction.* Catholic University of America Educational Research Bulletins, Vol. V, Nos. 9 and 10 (Washington: Catholic University Press, 1930), 82 pp.

20. Buswell, Guy Thomas, and Judd, Charles Hubbard. *Summary of Educational Investigations Relating to Arithmetic.* Especially Chapter VI. Supplementary Educational Monographs, No. 27. Chicago: Department of Education, University of Chicago, 1925. (Included in this reference are also the annual supplements by Buswell appearing in the *Elementary School Journal.*)

Footnote: This paper was accepted for publication in this journal some months before the appearance of McConnell's important study ("Discovery versus Authoritative Identification in the Learning of Children," University of Iowa Studies in Education, IX, No. 5; September, 1934). McConnell's problem closely resembled that investigated by Miss Chazal, a fact which will certainly lead the interested reader to consult the McConnell report. At first glance the results obtained in the two studies may seem to be wholly inconsistent. Such is not actually the case. Interpretation depends, in both studies, on the view that is held of the *purposes* of arithmetic instruction. On this account the Chazal study is published in 1935 without change as it was written in 1934. However, the McConnell reference should certainly be included in the bibliography of 20 items immediately above. W. A. B.

THE CONTENT OF EXAMINATIONS IN CERTAIN PROFESSIONAL EDUCATION COURSES[1]

W. I. PAINTER
Indiana University

ADVERSE CRITICISMS OF COURSES IN EDUCATION

THE work of departments and schools of education is severely criticized by faculty members of other departments and schools, by students who either are taking or have completed required courses in education, and even by school administrators. A great part of this criticism arises from a lack of understanding of the extent and nature of the content presented in courses in education.

The most outstanding of these adverse criticisms which are made concerning required courses in education are as follows:

1. Education courses contribute nothing toward successful teaching —subject knowledge is all that is needed.
2. There is too much overlapping in courses in education.
3. Much that is taught in education has no practical value in the actual school situation, for the knowledge of the best principles is too far in advance of usual practice.

Regardless of whether or not they can be justified, such intense criticisms merit consideration and should become instrumental in furthering improvement within education departments. A few studies have already been made for the purpose of discovering major points of emphasis and overlapping in various education courses, and the purpose of the study being reported in this article was to attack the same problem from a new point of view.

THE ANALYSIS OF EXAMINATIONS AS A METHOD OF DETERMINING THE CONTENT OF BASIC COURSES IN EDUCATION

According to a preliminary investigation, most faculty members agree that, especially in undergraduate courses, the tests which they give throughout a semester for the purpose of assisting in the determining of student marks are truly representative of the content of the course as they present it to their classes. A comparison of the examinations of a few instructors with syllabi which they have for their courses served to verify this conclusion. From these initial investigations, it seemed safe

[1] An abstract of a dissertation accepted by the faculty of the School of Education and by the Graduate School of Indiana University as fulfilling the thesis requirements for the degree Doctor of Philosophy.

to conclude that an analysis of examinations given throughout a semester by a number of different instructors would give a definite concept concerning the chief points of emphasis within various courses. A comparison of such analyses in several courses would serve to suggest some definite conclusions concerning the amount of overlapping which exists between the courses.

This study is an attempt to make such an analysis of examinations in eight different professional education courses. The examinations used were collected from as many instructors in these courses in the United States as were able or could be induced to coöperate. Each instructor furnished a complete list of the examinations which he had used in each of the courses during an entire semester since January, 1930. Table I shows the usable material collected.

TABLE I

MATERIAL USED IN THE STUDY

Names of courses	Number of examinations submitted	Number of questions listed in examinations
Educational Psychology	38	8,695
Educational Sociology	15	1,484
Classroom Organization and Management	21	2,491
Educational Measurements	30	5,403
Principles and Technique of Teaching	24	3,553
Introduction to Teaching	16	1,570
Introduction to Education	19	3,858
Secondary Education	31	5,251
TOTAL	194	32,305

CLASSIFYING THE QUESTIONS

The questions in each course were classified first into an outline of major topics and distinct sub-topics. The frequency of the recurrence of each topic was tabulated according to lists. By having advanced graduate students check the tabulation through independently tabulating representative lists, it was found that the error of judgment was only approximately two percent. In order to insure greater accuracy, texts were referred to whenever a doubt arose regarding the proper location of a particular question. If authors disagreed, the classification used by the majority was accepted.

A RECLASSIFICATION OF ALL TOPICS

All topics which appeared in the original classification in each course were transferred to coded cards and reclassified under a composite list

TABLE II

THE NUMBER OF QUESTIONS PER THOUSAND ON EACH MAJOR TOPIC IN EACH COURSE STUDIED

Names of major topics	Introduction to Education	Introduction to Teaching	Principles and Technique of Teaching	Classroom Organization and Management	Educational Psychology	Educational Sociology	Tests and Measurements	Secondary Education
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
History of Education in Foreign Countries	41			1		3		8
Comparative Education	15			2–				47
History of Education in America	96	1–			1–	5		110
Characteristics of the Teaching Profession	29	27	5	11		23		1
Special Duties of the Teacher	1–							1
General Fields of Teaching	4–	6		2–		2		1–
Securing a Position	1–	4–	1	2				
Training and Equipment of Teachers	49–	94–	14	44–	3	12	1+	14
Improvement of Teachers	8	12	1–	14–		2		2–
Teacher-School Relationships	4	19		18		1–		5
Teacher-Community Relationships	10	10–	1	12		3		3
Principles underlying Scientific Management			2–	17				
Classroom Organization and Routine	3–	11	2	39–				
School Government and Discipline	9	59	21	138		14		8
The Attendance Problem	1–	27		40		3–		2–
Character Education						7		1–
Preparing for the Opening Day of School				19				
Program for the First Day of School		1		10				
The *Daily* Program	3–	13	4	30–				6
The School Health Program and Health Factors	37–	17	10	70–	1	2		
Intermissions and the Play Program	4–	18	1	32		16		
Special and Extra-Curricular Activities	5–	3	1	6		4		16
The Meaning of Education	9	17	3–	7	2	22		9
General Aims and Objectives of Education	62	46	32	22	6	65		73–
Specific Aims and Responsibilities of the School	10	10–	5	18		11		45–
Specific Teacher Aims for Lessons or Units of Material	3	10–	1–	8–	4			
The Curriculum	39	17	9	19	3	84		150
The Course of Study		1–	17	2	1	3–		7
Methods and Subject-Matter of Psychology	1–				16	11		
The Behavior of Organisms					20–			
Heredity and Environment	2	8	4	2	33	22	1	2
Individual Differences	25	6–	14	5	59	7	3	18–
Original Equipment and Growth of the Child	59	31–	12	18	176	3–		26–
Intelligence	4	8–			39		19	4
Emotions, Feelings, Attitudes, and Ideals	6	1–		1–	52–			2
Mental Hygiene	5–	2	4		9	3–		1
The Educative Process	3	1	5	3–		3		
The Learning Process	33	47	46	14	118	14		10

TABLE II—*(Continued)*

Names of major topics	Introduction to Education	Introduction to Teaching	Principles and Technique of Teaching	Classroom Organization and Management	Educational Psychology	Educational Sociology	Tests and Measurements	Secondary Education
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fatigue in Learning		1–	1–		14–			
Permanence in Learning	5	6–	15	1	41	1	1–	1
Improvement in Learning	6–	3	1–		44	1–		1
How to Study	8	39	6–	3–	3			8
Types of Learning	7	4–	9		29–			1
Laws of Learning	25	19	15	8	33			
Conditioning Learning			1–		23			
Habit and Its Formation	6	3	8	3	21			4
Thinking	9	9	9		33–			1
Formal Discipline and the Transfer of Training	10	1–	2		36–			10–
Learning Products or Outcomes	1	8	1–		4			
The Teaching Process	7–	19	15	10–	16	1		6–
Types of Technique		3–	2–					
Conditions That May Affect the Teacher's Work		1	2–	2		1–		
Methods	32	43–	122	14	15	24		13
Directed and Supervised Study		6–	10–	4	1–	1–		4–
Types of Lessons and Lesson Planning	18	45–	53	11	1–			1
The Assignment	3–	11	17	6	12–			1
Establishing the Learning Situation	3–	4	10	1–	1–			
Adjustments to Individual Differences	10	24	15	26			4–	18
Directing the Recitation	3	16	23–	10				2–
The Art of Questioning	5	11	25	8–				
Developing Appreciations and Attitudes	7	1	26–			1		1–
Motivation	8	7	5–	29	6	2		3–
Instructional Materials and Their Use	2–	3–	10	3–				2
Measures of Teaching Efficiency	2–	2	2–	5		1		1
The Development of the Testing Movement	2				1–		26	
What Tests Are and What They Do			3		2		9	
Kinds and Characteristics of Tests	5–	1	4–		13–		57–	2
General Uses of Tests	8	11	7	3	10	7–	86	4
Intelligence Tests	5–	2		2–	6–		41	11
Educational Tests	3–	1–		3–	2–		81	
Criteria of Good Tests and Test Selection		1–	2–	3–	5–		75–	2–
The Testing Program and Its Administration	2	1	1–	4	1		24	
Characteristics of Informal Examinations							39–	
Advantages and Disadvantages of Types of Tests		3–	2–	2	4		55	
Constructing and Using Objective Tests	2–		1		1		132–	
Types of Objective Questions		1–	1–	2	1		30	

TABLE II—*(Continued)*

Names of major topics	Introduction to Education	Introduction to Teaching	Principles and Technique of Teaching	Classroom Organization and Management	Educational Psychology	Educational Sociology	Tests and Measurements	Secondary Education
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Statistical Calculations and Interpretations of Results	13	4	1	5 –	41		210 –	8
Place of Tests in Diagnosis and Remedial Teaching	1 –		2				15 –	
Criteria for Constructing Remedial Material							1 –	
Determining School Marks	2	1 –	1	12	2		38	18 –
Grading and Promotion	5 –	6 –	1	32 –	3 –		4	12
Nature and Functions of Educational Sociology						14		
A Sociological View of Education						26		
The Relation of the Individual to the Social Group			1	1 –	1	86		8 –
The Social Group and Its Relation to Education	5	2	3 –			90		
The Home and Its Relation to Education						45		
The Community and Its Relation to Education		1		1		33		3
The Problem of Social Personality						11 –		
The Relation of Education to Social Control						51		1 –
The Relation of Education to Social Progress						61		7
The Relation of Education to Democracy	4			1 –		35		
The Relation of Education to Internationalism						18		
The Relation of Education to Culture		1				25		
Relation of Education to Individual Efficiency			3			22		
Guidance	1 –	1	1 –			22		44
State and Federal Administration of Schools	59	22	1 –	5		9		14
Local Administration of Schools	50	15 –	1 –	8		23		21 –
Records and Reports		1 –	1	12		1 –		1 –
Plans of School Organization	32	17 –	1 –	4		5 –		66
Character and Classification of the School Population	2 –	2 –			1 –	5		60
Private and Denominational Educational Agencies	2	4 –				1 –		3
Organization and Administration of the School Library				2				2 –
School Buildings, Grounds, and Equipment	12	13 –	5	84				2
The School Survey						11		
The Philosophy of Education	8 –	6 –		1				1
Vocational Education		3 –				1 –		2
Outstanding Individuals in Education	4	20 –	32 –	12	6		33	20
References in Education	8 –	11	3	6 –	1	2	4	4
Special Subjects	6	15 –	283	4	23		11	20
Interpretation of Educational Terms	5 –	13 –	14 –			8		2 –
Miscellaneous	6	10	3 –	12 –	2 –	9	1	10 –

of all major topics found in the eight courses. Each section of this reclassification was checked for accuracy by two or more faculty members in the School of Education at Indiana University. The new classification made possible the comparison of the various courses for the purpose of discovering any overlapping which might exist in the content.

After this reclassification had been completed, a table was made showing the number of questions per thousand which were found in each course on each major topic. This table (Table II) indicates the relative amount of overlapping among various courses as this overlapping is shown by the duplication of emphasis given to the major topics.

THE INTERRELATION OF THE VARIOUS COURSES

Since a topic may be tested in different courses from a different point of view, it is clear that a repetition of emphasis on a particular topic is not necessarily exact duplication. However, it is certain that any great amount of repetition in the emphasis given a particular topic in two or more courses does involve a great amount of exact duplication. Bearing this in mind, it can be seen from Table II that there is some overlapping,

TABLE III

THE NUMBER OF TOPICS IN ANY PAIR OF COURSES WHICH ARE TESTED BY MORE THAN FIVE QUESTIONS PER THOUSAND IN EACH COURSE

Names of courses	Introduction to Education	Introduction to Teaching	Principles and Technique of Teaching	Classroom Organization and Management	Educational Psychology	Educational Sociology	Tests and Measurements	Secondary Education
Introduction to Education	39	29	19	21	17	11	3	22
Introduction to Teaching	29	47	23	32	16	16	4	20
Principles and Technique of Teaching	19	23	30	16	14	9	3	14
Classroom Organization and Management	21	32	16	38	9	11	2	17
Educational Psychology	17	16	14	9	28	7	7	12
Educational Sociology	11	16	9	11	7	33	1	14
Tests and Measurements	3	4	3	2	7	1	18	5
Secondary Education	22	20	14	17	12	14	5	33

and it is evident that there is some absolute duplication in testing, and probably in teaching, in any institution which offers two or more of these courses.

DUPLICATION OF EMPHASIS IN PAIRS OF COURSES

Table III shows the number of major topics on which there were more than five questions per thousand in each pair of courses. For example, nine topics were tested by more than five questions per thousand both in Educational Psychology and in Classroom Organization and Management. By reading this same table diagonally, it also shows the total number of major topics out of the entire 111 which were tested by as many as six questions per thousand in each course. For example, 39 topics in Introduction to Education and 47 topics in Introduction to Teaching were tested by as many as six questions per thousand.

SUGGESTIONS AND CONCLUSIONS

As a result of this study, it seems logical to suggest that absolute repetition of basic information should be given only for the purpose of review, and that these facts should not be tested as an integral part of successive courses in education.

In order to eliminate the unnecessary repetition of subject-matter in courses in education, it may be desirable in many cases to reorganize the curriculum completely on a unit basis. The final reorganization of topics in this study would be quite valuable in developing such a curriculum. Factual information might be supplemented by a sufficient number of problems taken either directly or indirectly from actual situations to insure mastery of the basic principles and a knowledge of their functioning.

Not only the overlapping between courses but also the imperfections of many of the tests submitted for this study calls forth the suggestion that each teacher within any department of education might make a comprehensive list of test questions covering every topic presented in each of his courses. A comparison of these lists will show the degree of overlapping between courses given within the department. Furthermore, such a project should aid teachers considerably in improving their class tests.

For future research, tests in pairs of courses should be analyzed according to a common outline in order to determine the amount of exact duplication in tests in various courses. Also, the amount of profitable repetition in subject-matter during the preparatory training of prospective teachers should be determined. This degree of desirable repetition might be calculated by means of duplicate forms of carefully prepared tests.

In conclusion, it may be said that this study of the content of examinations furnishes a more accurate concept of the emphasis usually accorded to the various topics included in each of the eight courses than does either the analysis of texts or of syllabi. Consequently, the results of this study should be most valuable as a point of departure in improving the organization either of the curriculum or of examinations in education.

NEW DATA ON EARLY ENGINEERING EDUCATION

H. G. Good
Ohio State University

Until a century ago engineers prepared for their work, as they had done for the fifty preceding centuries, by observation, practice and apprenticeship. The professional training of James Geddes, Charles Brodhead and Benjamin Wright who built the Erie Canal must have been very similar to that of the builders of the pyramids and of the Roman roads and aqueducts. But a change was now imminent. Classes and schools for engineers were about to begin; had begun in France in 1747 with the École des Ponts et Chaussées and in Germany in 1765 with the Königliche Sächsiche Bergakademie. Military engineering was also taught in schools both in Europe and America. Some passages which look toward education in military engineering are to be found in Washington's correspondence. Dr. John Anderson of the University of Glasgow offered the new republic his services as "Engineer Artillerist and Director of the Gun Foundry of the United States of America." This was the John Anderson (1726-1796) who founded a famous Glasgow institution for teaching applied science. He proposed now to teach American cadets either at Glasgow or in the United States, as it might be arranged. Washington was keenly interested but doubtful about ways and means. Tobias Lear, his secretary, visited Glasgow and made an enthusiastic report on Anderson's achievements and his standing in his community. "If we should carry into effect the intention of establishing a national University in Washington City," wrote Lear, "Mr. Anderson would be a great acquisition to it, provided he could be drawn over there."[1] Nothing came of these efforts. But West Point got itself established; and this furnished a certain stimulus to civil engineering. Many of its graduates resigned their army commissions, almost as soon as they had earned them, to enter civil occupations, sometimes as engineers and sometimes, as we shall see, to teach engineering.

Civil engineering was taught at Rensselaer, in a course regularly organized for that purpose, first in 1835 although a few men who became engineers had secured their basic training there before that date. That the course was comprehensive rather than technical and specific is suffi-

[1] Washington Manuscripts, Library of Congress: Washington to the Earl of Buchan, April 22, 1793; Anderson to Washington, August 26, 1793; Lear to Washington, January 26, 1794. On Anderson, see D. N. B., I: 383.

ciently indicated by the fact that although it was only a one year course it yet included a good deal of elementary mathematics and physics. The announcement read thus: "Students of the engineer corps are instructed as follows: Eight weeks in learning the use of instruments (as compass, chain, scale, protractor, level, etc.) with their applications to surveying, leveling, calculating excavations; eight weeks on mechanical powers, circles, conic sections, construction of bridges, arches, railroads, canals, running circles for railways; four weeks in calculating the quantity of water per second supplied by streams as feeders for canals or turning machinery; four weeks to study the effect of steam and wind as applied to machinery."[2] Such an outline shows clearly the status of engineering education at that time.

Some curious misunderstandings of the origins of practical education in America seem to be widely spread. One is that Rensselaer was opened (1824) as a school for engineers; it was actually established as a school for farmers, mechanics, and rural school teachers. Another mistaken belief, apparently common to educators and engineers, is that the two schools which have been mentioned, the Military Academy and the Rensselaer Polytechnic Institute, were until 1847 the only schools offering specific training for engineering.[3] It may be true that these were the only permanent schools in which engineering was regularly and continuously taught long before the mid-century. But it is the purpose of this paper to present evidence proving that several schools and colleges which later reverted to the regular literary and classical tradition taught civil engineering about as early as Rensselaer. Indeed, I intend to illustrate—though there is not space to prove—a larger thesis. The American college was founded to provide a general education suitable as preparation not only for the gospel ministry but also for the other vocations for which learning might be necessary, including the vocation of intelligent living. As practical life became more highly specialized the college developed,

[2] Quoted from Turneaure, F. E. "The Engineering School and the Engineer." *Journal of the Western Society of Engineers*, XXII (January, 1917), pp. 1-15. The passage is much abridged but sufficiently accurate for present purposes. It was collated for me with the 1835 original by Mr. E. W. Siple through the courtesy of Professor Ray Palmer Baker, both of the Rensselaer Polytechnic Institute.

[3] Mann, Charles Riborg. *A Study of Engineering Education*, Bulletin Number Eleven (New York: Carnegie Foundation for the Advancement of Teaching, 1918), pp. 4-5.

one after another, courses intended to prepare men for these practical demands in the fields of medicine, jurisprudence, teaching, business and also in engineering, only to see them grow into separate schools and leave the sheltering fold of their mother, the arts college. As the positive sciences have deserted their ancient mother, philosophy, so have the special schools left the college to set up for themselves. This is the thesis which the following facts will illustrate.

Civil engineering as a profession grew out of surveying and practical experience in the construction of works. Not only Geddes and others already mentioned but also B. H. Latrobe, Jonathan Knight and practically all our early engineers were thus prepared. Colleges, academies and private schools very frequently taught surveying even in the eighteenth century. Fairfield Academy, New York, in which Canvass White secured his education about 1813, although it was at that time accepting subsidies for the preparation of Episcopal clergymen,[4] is singled out by Professor Turneaure, I do not know upon what evidence, as "the best engineering school outside of West Point."[5] The evidence that the academies often taught surveying, mechanics, navigation and practical mathematics is conclusive. About 1835 several schools began to attempt something more; and it is this that we are especially presenting here.

One of these pioneering schools was Geneva College, (now Hobart College), at Geneva, New York, which in 1831 announced a Professorship of Engineering and Statistics (or economics), "over which General Joseph G. Swift has been elected to preside. The College has been fortunate in obtaining the services of a gentleman so in every way [*sic*] qualified for the duties of the station to which he is called."[6] This professor, Joseph Gardner Swift (1783-1865), is known as the first graduate of West Point (1802), was brevetted brigadier-general (1814), carried out important railroad engineering work and was also a traveller and writer.[7] He continued to hold the professorship at Geneva College until 1845 and during the last nine years he served under a president, Benjamin Hale, who was certainly well-disposed to engineering. Yet one may doubt whether he

[4] Sherwood, Sidney. *History of Higher Education in the State of New York*, U. S. Bureau of Education, Circulars of Information, No. 3 (Washington: Government Printing Office, 1900), pp. 243-252.

[5] Turneaure, F. E., *op. cit.*

[6] News item from *National Intelligencer*, Washington, D. C., August 20, 1831.

[7] *Appleton's Cyclopaedia of American Biography*, VI, pp. 10-11.

accomplished much in that field of education. Few of the early graduates of Geneva College became engineers; and the remarkable plans for a course to prepare men for "the actual business of life" which had been announced in a circular of 1824 did not attract the funds needed to carry them out.[8]

In 1835, John Millington (1779-1868) was elected professor of chemistry, natural philosophy and engineering at the College of William and Mary. Millington was an English engineer, teacher and member of the Royal Society of Arts, as it was later called, and was associated with McAdam in the construction of the new macadamized roads. He was a man of the most various talents and ingenuity. While at William and Mary, where he remained until 1848, he wrote his *Elements of Civil Engineering* (1839) which may have been the first American textbook in the field.[9]

Cincinnati College was opened in May, 1819, with the Reverend Elijah Slack from Princeton as President and Professor of Mathematics, Natural Philosophy and Chemistry. A new college in a frontier town with a scientist-president might be expected to emphasize the applications of science and this was, in a small way, done. In a college advertisement of 1825 the usefulness of the institution to the arts and manufactures is asserted and favorable attention is called to the schools of mines then beginning in Germany and to the mechanics institutes movement in England. The advertisement says: "In manufactures in general our institutions lead the way. They devolve principles which the industrious mechanic can successfully carry into effect. From the humblest department in the arts to the most extensive and complicated, the mechanic must be much indebted to mathematics, to philosophy and especially to chemistry, for his improvement and progress.

To make our college profitable to this important part of our citizens, it is proposed to deliver, during the winter evenings, about two lectures per week, accompanied with numerous experiments . . . . The subjects of discussion will be Mechanical Philosophy and Chemistry, with a distinct reference to the arts."[10] The fact is that the college was grasping at straws to save itself from extinction.

[8] Sherwood, Sidney, *op. cit.*

[9] Holmes, George F. "Professor John Millington, M.D.," *William and Mary College Quarterly Historical Magazine*, Second Series, III (January, 1923), pp. 23-35. There is also an account of Millington with further bibliography in the *Dictionary of American Biography*.

[10] *Liberty Hall und Cincinnati Gazette*, August 16, 1825.

For about a decade after 1825 the academic department of Cincinnati College was closed and then in October, 1836, it was reopened with a new faculty of extraordinary brilliancy, including William Holmes McGuffey, President, Ormsby M. Mitchell, Edward D. Mansfield and James B. Rogers, names that will be immediately recognized by the student of American education and science. The announcement has the following sentences: "Each of the Professors will be at liberty to receive pupils, in his own branch as irregulars. Under this permission, Professor Mitchell[11] [who in 1829 had graduated at West Point] will forthwith organize a class in Civil Engineering, of which his regular pupils will likewise be members. To afford opportunities for practice in this important study, the professor will be allowed a vacation of four months in the year, during which he will be in the field with his students, engaged in actual engineering."[12] College and professor were to share equally the fees from the "irregulars."

This arrangement by which a professor was permitted to teach his private students in the regular classes of the college—an example of a not infrequent kind of administrative unwisdom—bore its natural fruit. Mitchell at once, over his own name, advertised a "Theoretical and Practical School for Civil Engineering." He said:

"A school for the thorough education of young men in the science of Civil Engineering has been organized in conjunction with the Literary Department of the Cincinnati College.

Civil Engineering constitutes a part of the regular collegiate course; but, for the accommodation of those who may wish to devote themselves exclusively to the study of Engineering, a class of irregulars will be formed on the first of November.

Eight months of each year will be devoted to study, and the remaining four months the Professor intends to pass, with his class, on the field, engaged in the survey and construction of actual works.

---

[11] An interesting biography of Ormsby MacKnight Mitchel (1809-1862) was written by his son, F. A. Mitchel, and was published. (Boston: Houghton, Mifflin & Co., 1887), 392 pp. In the text above, I am spelling the name as it is spelled in the contemporary sources. There is also a sketch in the *Dictionary of American Biography* but the engineering courses are not mentioned. Also, Edward D. Mansfield, a faculty colleague, has a flattering notice in *Personal Memories* (Cincinnati: Robert Clarke & Co., 1879), p. 277.

[12] *Cincinnati Daily Gazette*, October 19, 1836. The information in the last sentence of the paragraph is taken from the Mitchel biography (see Note 11, p. 45).

The course of study will embrace a full knowledge of Mathematics and Mechanics, Chemistry, Mineralogy, and Geology, as preparatory to the study of Engineering proper. The course of Civil Engineering will include: Materials—timber, stone, brick, iron, mortar, etc.; Architecture—stone cutting, carpentering, masonry, bridges, viaducts, etc.; roads—turnpikes, McAdam's roads, rail roads, canals, slack water navigation, harbors; motive powers—wind, water, steam, animal power, compressed air, etc.; machinery—for mills, furnaces, rolling mills, foundries, etc.; steam engine—locomotive engines; and drawing—right line, perspective, topography.

The price of tuition is $50 per session of eight months, with the privilege of entering the classes of the professors of the Literary Department.

It is presumed, that the student will realize, from his field work, an amount sufficient to defray a good proportion of his College expenses . . . .

Those who enter their names first on the list of the class will be entitled to preference for employment, during the vacation.

For further particulars address the subscriber . . . "[13]

A few years later this very confident, aggressive and enterprising young man also offered his services as a consulting engineer, in the following terms:

"Difficult Practical Questions."

"Questions are constantly occurring in Mechanics, Machinery, the useful arts, and in every branch of business, which require for solution an accurate knowledge of the exact and mixed sciences.

The subscriber proposes to furnish solutions for all such questions, embracing the measurement of lines, surfaces, and solids, the division of land, calculations in machinery, plans and estimates for every variety of civil construction, roads, bridges, etc. In short, he will answer all questions involving the application of the sciences to practice. He may be consulted at his residence . . ."[14] Would you say that the adjectives applied to Mitchell in the opening sentence of this paragraph are justified? It is a pleasure, even after a century, to report that he made a fortune, not by teaching(!) but by railroad construction and finance and that he developed in Cincinnati one of the pioneer astronomical observatories in the United States. How successful the civil engineering courses

[13] *Cincinnati Daily Gazette*, October 21, 1836.

[14] *Cincinnati Daily Gazette*, February 9, 1839.

were, we do not know. At any rate he had to meet competition. Elijah Slack, former president of the College but who was left out of the reorganized faculty, also offered to qualify "such gentlemen as may wish," to become "Engineers in the formation of Railroads, Canals, etc. The teaching for two evenings in each week will be on the Demonstrative and Practical Mathematics required, and the use of the most important engineering instruments. In addition, a lecture will be delivered one evening each week of the quarter on the best methods of locating a Road or Canal, the most approved Rails, the construction and movement of Steam Carriages on Rail Roads, etc."[15] This announcement which came out in February, 1836, eight months before the new college faculty was announced, may have had some significance in the college politics of that early day. It may not be possible to discover now what success either of these teachers had in the preparation of professional engineers for the transportation development of the 1830's. In this respect we are a little but only a little more fortunate in regard to the next school which we shall take up.

The institution to which we have just referred is Georgetown College, Georgetown, Kentucky, which was established by the Baptists in 1829. A School for Civil Engineers was opened in connection with the college in May, 1835, the moving spirit being T. F. Johnson, reputedly a West Pointer,[16] who held the chair of Mathematics and Civil Engineering. Upon completion of the first term's work he issued the following statement:

"The Professor of Mathematics is proud and happy in being able to announce to the public the triumphant success of his experiment. Young men of the first order of talent, from every quarter of the Union, have assembled here to avail themselves of the advantages of this school . . .

"Several who were well advanced on entering the school have been able to complete the full course in six months, including the theory and practice of Civil Engineering—thus qualifying themselves at an expense of $75, for an honorable, a healthy and a lucrative pursuit, in which they can command for their services at the outset, from $500 to $1000 per

[15] *Cincinnati Daily Gazette,* February 9, 1836.

[16] The college advertisement says, "Educated at West Point," *Commonwealth,* Frankfort, Ky., May 2, 1835; but the records of the U. S. Military Academy fail to show that T. F. Johnson was ever admitted as a Cadet, (Personal letter from the Adjutant).

annum, and with the experience of one or two years the double of the latter sum.

"The course is as follows, viz: Algebra, Geometry, Trigonometry, Surveying, Conic Sections, Natural Philosophy, Chemistry, Geology, Mineralogy, Engineering, and a tour in the vacation, in which the practical part of the course is attended to—the Professor attending the Class with his theodolite, Surveyor's Compass, Levelling Instrument and all the necessary apparatus for taking a Topographic, Geological, and Mineralogical survey of the country to the distance of about twenty miles from Georgetown."[17] In the following year the course was expanded to include work on the construction of Railroads, Canals, Locks, Bridges, Aqueducts. The course was then to demand one year of the student's time unless he had already "made considerable progress in Mathematics and Natural Philosophy at entrance."[18]

To Professor Johnson, it seemed that the engineering profession presented very extraordinary opportunities at this time. "This school," he wrote in 1836, "has been in operation twelve months, in which time not more than ten or twelve young men have been qualified for the field."

He continued:

"The West Point Academy adds a very limited number to the profession annually, and most of these are employed by the Government.

How shortsighted and unobservant of passing events must they be, who seem to fear that the market will be overstocked from these two schools! Take for instance the State of Ohio, and see what movement she is making on the subject of Internal Improvements. During the recent session of her Legislature, there were incorporated within her limits, 32 Rail Road, 11 Turnpike and 5 Canal companies; requiring about 100 Engineers, more than this school will supply in 10 years at the present rate." He refers to developments in Kentucky, in Indiana, in the whole Mississippi Valley. "The Profession of Civil Engineer is *now* the most lucrative and honorable in America. What must it be in three years . . . ?"[19] In less than six months the "Crisis of 1837" was upon the country.

During this same period of engineering enthusiasm, Joseph Ray, as Secretary of the Faculty of "Woodward College and High School," of

[17] *Commonwealth*, Frankfort, Ky., September 26, 1835.
[18] *Ibid.*, April 20, 1836.
[19] *Commonwealth*, Frankfort, Ky., April 20, 1836; and see also issues for May 2, 1835, December 21, 1836.

Cincinnati, announced that "In the Mathematical Department [of that institution] particular attention continues to be given to Civil Engineering, Surveying and other practical branches."[20] Miami University also meant to offer her services in providing engineers for the canal and railroad age. "While the Elements of Civil Engineering have always been pretty well taught in the Mathematical Course, the practical application of these elements, will in future be more minutely attended to," so an announcement declares.[21] Lastly, the City Academy of Washington, D. C., reported in 1839 that more than "fifty young gentlemen have been educated at this school within the last six years for practical engineering and the navy and are now actually engaged on the various canals and railroads at a salary varying from ten to fifteen hundred dollars per annum;" and that "practical field exercises and solar observations" were carried out on Saturdays.[22] We have now presented our evidence that many colleges and academies, beside West Point and Rensselaer, and especially those on the frontier, attempted to teach civil engineering in the eighteen-thirties. There is no intention to claim that the attempts were successful or influential; but it should be remarked that Rensselaer in 1835 was also a marginal school, rapidly losing to Yale, Union and other aggressive institutions her distinction as a center for general science teaching. Rensselaer, also, had to find a new and more specific task if it was to survive and grow.

In the great march of America across the continent it was noticed that new towns on the far Western frontier were more progressive than the old towns in the East, that the streets of Medicine Bow were wider than those of Boston, that Topeka had electric lights and electric cars while New York still managed to get along with gas lamps and horse cars; and it may also be remarked, not for the first time, that there is a certain conservativeness in human nature, a spirit of getting along with the old and making it do, which tends to communicate itself to all human institutions, including colleges. While old firmly established institutions got along very well with their medieval and Renaissance curriculum, the new frontier colleges, unencumbered by tradition and without alumni, were more enterprising. They had to be. At the opening of the turnpike,

[20] *Cincinnati Daily Gazette*, November 1, 1836; August 15, 1837.
[21] *Ibid.*, September 1, 1837.
[22] *National Intelligencer*, Washington, D. C., January 2, 1839.

canal and railroad age, therefore, they turned to civil engineering, for, as Professor Johnson said, it required a good many engineers to complete the national turnpike to Vandalia, Illinois; to build the canals; and to raise the number of miles of railroads from 23 in 1830 to 3,000 in 1840. Hence these embryo engineering courses.

EDITORIALS

EXPRESSING THE SCIENTIFIC SPIRIT THROUGH BETTER SUPERVISION

SOME one-hundred thousand administrative and supervisory officials, a million teachers, and twenty-five million pupils today have a vital concern in better supervision. An important factor for greater success of the school is the quality of the leadership. If the leadership is broad, well balanced, and far seeing, putting first things first and last things last, distinguishing fundamentals from minutia, then some of our expectations may be realized in a substantial way. To stimulate those who are already thinking about this responsibility, the writer offers the following principles of good supervision which represent one approach to scientific thinking about the problems of education:

I. Good supervision proceeds from a clear understanding of the purposes and functions of supervision. The purpose of supervision is to improve the learning of pupils. The functions commonly associated with good supervision are:

1. *Research.* In the discharge of the functions of supervision, the supervisor must study, and study systematically, the means, methods, and materials of instruction to discover and verify important facts, principles, and relationships to be employed as sources of ideas about, and criteria for, judging and improving the outcomes and processes of instruction. Only by this means can teachers and supervisors evaluate the instruction, keep it responsive to social needs, and in harmony with the growth of scientific knowledge. The supervisor, as an educational leader, should know his field thoroughly and should be able to stimulate others to constructive problem solving, helping them to discover and define instructional needs, to choose and apply appropriate methods of research, and to digest and interpret the results of research to the end that the instruction may be improved.
2. *Evaluation.* In the discharge of the functions of supervision, the supervisor must evaluate the outcomes and the factors conditioning the outcomes of instruction. The more important factors conditioning the outcomes of instruction are: the teachers, their interests, abilities, and methods of teaching; the pupils, their interests, abilities, and methods of work; the curriculum; the materials of instruction; and the socio-physical environment

for learning. The ultimate purpose of evaluation is to improve the products and processes of instruction.

3. *Improvement.* Employing the facts, principles, and relationships, assembled and verified in the exercise of the evaluation and research functions of supervision, the primary purpose of supervision, working through the instrumentality of the teacher, the child, and the curriculum, is to improve the products of learning. Out of the evaluations of particular teaching situations and the larger body of verified knowledge representing the accumulation from systematic thinking about the problems of education the supervisor must offer a program for the improvement of instruction. The ultimate criteria by which the effectiveness of this program can be judged are the changes produced in pupils when measured with reference to the objectives of education.

II. Good supervision is democratic:

1. Democratic supervision respects the personality of the teacher: her ambitions, special capacities, and personal idiosynerasies; the teacher as a member of a democratic society has ideas, preferences, and desires that the supervisor should respect.
2. Democratic supervision recognizes and deals sympathetically with the human element of supervision; it is humane, kindly, and considerate.
3. Democratic supervision stimulates and encourages initiative, self-reliance, and individual responsibility in the teacher's discharge of her duties as a teacher.
4. Democratic supervision provides opportunities for and encourages freedom of expression in all matters of instructional policies.
5. Democratic supervision emphasizes the coöperative character of supervision wherein teachers, pupils, and supervisors work together harmoniously for the improvement of instruction.

III. Good supervision is well planned. A good supervisory plan contains:

1. A clear-cut statement of its objectives based upon a careful study of the teaching situation which the supervisor hopes to improve.
2. A clear-cut outline of the means, methods, and materials to be employed in the attainment of the objectives.
3. A clear-cut outline of the criteria, checks, and measures to be employed in the evaluation of the results of the program of supervision provided.

The steps in well planned supervision are:

1. Getting the needs of the particular teaching situation to be improved clearly in mind. To get the needs of a particular teaching situation clearly in mind one must study the situation. Studying the situation, if it is to be done systematically, involves:
   (a) Considering the appropriateness of the teacher's objectives. Good teaching proceeds from carefully chosen objectives.

(b) Evaluating the outcomes of the instruction. To evaluate the outcomes of instruction one must compare the pupil's status as determined by the application of appropriate instruments of measurement, with his capacity to achieve the purposes of education.

(c) Studying the antecedents of effective learning: the teachers, their interests, abilities, and methods of teaching; the pupils, their interests, capacities, and methods of work; the curriculum; the materials of instruction: textbooks, supplies, and equipment; the socio-physical environment for learning; and all other factors limiting the products of learning, to discover the causes of satisfactory and unsatisfactory pupil achievement.

(d) Formulating an hypothesis or hypotheses as to the probable cause or causes of deficiencies observed in the outcomes of instruction from a study of the symptoms of successful and unsuccessful pupil achievement found in the situation under observation and from one's own past experiences with similar situations, the reported experiences of others, and systematic investigation.

(e) Checking for the presence or absence of the supposed causes or cause of unsatisfactory pupil achievement through the use of appropriate instruments of measurement.

2. Searching for ideas about what to do: from a survey of one's own past experiences with similar situations, the reported experiences of others, and systematic investigations, one gathers suggestions about what to do.

3. Formulating a plan for the improvement of the instruction under observation. This plan should be continuous, and progressively modified to meet the needs of changing situations; it is never static; it is always hypothetical.

4. Putting the plan into operation: In putting the plan into operation one must secure the necessary materials, decide upon how the plan is to be put into operation; and provide teachers with the necessary training.

5. Adjusting the plan to meet the needs of individual teachers, pupils, and class. While planning is always done with reference to particular situations, as one acquires more information about those situations one almost always finds that it is necessary to modify one's plans to meet newly discovered needs and conditions.

6. Evaluating the results of the plan in operation. To improve one's supervision one must know the results of the supervision. Just as good teachers attempt to evaluate the results of their instruction, good supervisors should evaluate the results of their supervision.

IV. Good supervision is based upon acceptable educational theory:

1. As it relates to the problems of classroom instruction
   (a) It precedes from well chosen teacher and pupil objectives.
   (b) It is based upon well chosen, well graded, and well organized subject matter and activities.
   (c) It recognizes that individuals differ and adapts the aims, content, methods, materials, and standards of attainment to these differences.
   (d) It is well motivated, utilizing the pupils already attained interests to grow new interests.
   (e) It conforms to the principles of economy in learning.
   (f) It recognizes the importance of the materials of instruction: textbooks, supplies, and equipment.
   (g) It recognizes the importance of the socio-physical environment for learning.
   (h) The results are evaluated broadly in terms of the major objectives of education.
2. As it relates to the training of teachers in service:
   (a) Good supervision, like good teaching, is goal-centered and purposeful. The supervisor's objectives are derived from a study of the needs of particular teaching situations.
   (b) The interests, needs, and capacity of teachers are not all alike. The activities, methods, and materials of supervision must be adapted to the needs of individual teachers.
   (c) Interest, satisfaction, and success are important factors in learning to teach. The methods of supervision should promote favorable attitudes toward supervision and learning to teach.
   (d) Learning is re-acting. Learning proceeds from the critical analysis, reconstruction, and generalization of experience. No perfunctory observation of teaching, attendance at lectures, or the routine performances of the teaching act will train teachers effectively.
   (e) Good supervision, like good teaching, employs problem solving as an important method of learning. Teachers as well as supervisors should be allowed to see and solve problems of instruction. An important prerequisite for learning to teach is a problem consciousness.
   (f) Knowledge of progress is an important condition of effective learning. Supervisors should assist teachers in developing standards by which they may have definite information as to the progress that they make in the improvement of instruction.
   (g) Supervisors in attempting to improve their methods of supervision must learn more about the mental-motor processes involved in learning to teach, the particular difficulties

experienced by different teachers working under different conditions and at different levels of maturity, and the conditions for economical learning to teach.

V. Good supervision employs orderly procedures of thinking in studying, evaluating, and improving the products and processes of instruction. The characteristics of good thinking are:
1. It is unbiased, free from preconceived ideas and prejudices.
2. It is hypothetical. Supervisory diagnoses and remedial adjustments are always hypothetical.
3. It is based upon fact: First, the verified facts, principles, and generalizations that constitute the organized knowledge of education and the criteria in terms of which judgments are made about particular teaching situations; and second, accurate information about the particular teaching situations.
4. It is based, as far as possible, upon accurate measurement, instead of estimates, guesses, and general impressions. All instruments of measurement should be carefully validated.
5. It is free from logical fallacies. Some of the common logical fallacies in supervision are:
   (a) argument from a single or limited number of instances;
   (b) argument from positive instances, the neglect of negative instances;
   (c) the omission of evidence contrary to one's opinion;
   (d) failure to observe important circumstances attending different phenomena;
   (e) attributing to a single factor the effects of two or more factors;
   (f) argument from analogy;
   (g) failure to discriminate between material and immaterial circumstances;
   (h) hasty generalization from insufficient evidence.
6. It is comprehensive. The products and processes of instruction must be viewed broadly and not from partial and limited points of view.
7. It is productive. It must produce workable solutions.

VI. Good supervision, like good teaching, is known by its results:
1. It produces with a minimum expenditure of time, money, and energy the desired changes in pupils when measured with reference to the objectives of education.
2. It produces better teachers,—happier, better adjusted, and better trained, and mentally alert teachers who attack their problems objectively, free from prejudice and motivated by a deep sense of social service.
3. It produces a better socio-physical environment for learning: good food, clothing and shelter both in and out of school, and a social environment favorable to learning; proper home condi-

tions, wholesome companionship, and an opportunity to work free from distracting influences.

4. It supplies teachers with better materials (textbooks, supplies, and equipment) with which teachers and pupils may work. Teachers and pupils cannot accomplish what is expected of them unless they are supplied with the necessary materials of instruction with which to work.
5. It provides a better curriculum through which the pupils may realize the purposes of education,—a curriculum which supplies the pupil with socially valuable and interesting activities which are within the pupil's capacity and provides him with experiences that make him a happier and more useful member of society.

A. S. BARR

PERSONALITY AND CITIZENSHIP

John Ruskin wrote on education as follows:

"The entire subject of pure education is to make people not merely do the right things but enjoy the right things—not merely industrious but to love industry—not merely learned but to love knowledge—not merely pure but to love purity—not merely just but to hunger and thirst after justice."

Can the school so affect personalities as to bring them not merely to do the work of good citizens but to joy in realizing in citizenship the love of righteousness, industry, knowledge, purity, mercy, and justice as a common necessity?

The problem here raised concerns the source of man's powers to do and to know as a personality and as a member of society. Mankind has a history rather than a science of conduct because individual persons are both personalities and members of society. Personality as applied to man recognizes the uniqueness of each individual and his ability to use his intelligence and the attained civilization of his people to seek added attainments for himself and for his generation.

Some definitions are needed by which to state this situation clearly.

Intelligence is the name given to man's mental power to hold an experience in the mind as knowledge; and to find relations between new experiences and this knowledge; also to organize such known relations in a way to anticipate new experiences and to plan new action. This definition is formulated in terms of what are called ideas formed from experience. Such concepts are concerned with relations between things or persons and have only indirect connection with the uniqueness of in-

dividuals. This action of intelligence has the functions of informing the mind as it acts to use the knowledge gained.

The power of intelligence to know and to organize the character of one's own purposes constitutes the basis for the uniqueness of personality. *Intelligence*, in its full sense, is a power to experience a personal relation in social activities. It tends to hold social reactions in mind as an experienced understanding; to relate this to other like experiences; and to anticipate the recurrence of this direct understanding in idealized relations. It extends anticipated responses into the form of permanent ideals. Intelligence as social understanding does not need to hold particular experiences in the mind as ideas to recall external relations since it can employ ideals. Its ideals give form to the mental action of understanding and have little need for words, as the meaning of ideals is in the experiences themselves. For this reason the young infant uses his mental power in this form of experienced relations and knows social responses as having meanings related to the joy of living. He knows this joy as clearly as, and more definitely than, he knows the means used to give physical comfort. His ideals of personalities are not so indefinite as are his ideas of physical effects before language is used.

These definitions are given as possible aids to the study of personal and social development in school education. We need to explain why character education fails when, as is now the case, it is only added onto the old education for knowledge and habit reactions.

These definitions indicate that human direction of life has its vital control in social understanding and ideals. In terms of the above definitions the school may be advised that intelligence, as it works with ideas about the relations of things and of persons, acts also and at all times as social understanding and as such works with the ideals which give form and purpose to personality.

We have talked much about interest in immediate activities and projects. The real drive for the growing mind is in an *enthusiasm* for the skill in directing thought and action which makes the doing itself a delight and insures the satisfaction that comes from things well done. Such enthusiasm calls out the fullest use of ideas which give the needed knowledge of things and of relations and also calls out from the personality the ideals and clear understanding of values and appreciations that give joy to the doing.

From this introduction we may take an extended view of education for home relations and the responsibilities for membership in society.

Glimpses of these relations and this responsibility, even in anticipation, are the source of the enthusiasm for education as it develops the whole child. The problem of the school is to direct all of its activities toward so organizing each study and line of training as to connect each item of knowledge and each step in training with the enthusiasms for living relations to be realized as each item and step is clearly advanced toward mastery of the needed knowledge; and as the realization of values, which belong to the full ideal of living relations, is seen to be the recognized end.

This probably means that no education worthy of the name results from mere habit training or use of words connected only with their meaning as expressing separate ideas. Habit training in connection with education is but a way of checking the skill attained as this is related to the skill yet needed and word knowledge has value only as it is needed to facilitate the use of attained knowledge in the effort to master new meanings of life.

Jeremiah W. Jenks in *Citizenship and the School* says (page 79), "In training for citizenship, our first, and if this is well learned it need be our only, lesson is the teaching of proper ideals."

G. A. B. AN OBSERVER

REVIEWS

Address all communications relative to book reviews to Editor Kai Jensen, University of Wisconsin, Madison, Wisconsin.

Eurich, A. C., and Carroll, H. A. *Educational Psychology* (New York: D. C. Heath and Company, 1935), pp. vii + 436.

It has taken the psychologists concerned with educational processes a long time to recognize that merely redressing a theoretical and general psychology text does not make an educational psychology text, but these authors have taken the rather bold step of presenting real educational problems confronting the teacher in a psychological setting.

Students of educational psychology ordinarily have had elementary psychology courses, and the present authors build their book upon this fact. There is little reference to the physiological processes involved in behavior, such as sense organs, nervous system, and reacting organs. The authors also dodge the problem of the presentation of various theoretical viewpoints which so frequently confuse and bewilder the beginning student in educational psychology. Instincts and emotions, which have been treated so extensively in most texts, are all but ignored in the authors' attempt to portray psychology as a functional subject with the school child as the focal point of their interest. In place of these problems the authors have wisely substituted a brief discussion of study habits, which enhances the value of the book to the students.

The subject matter treated in the book may be summarized as falling in the following fields of study: Methods and Subject Matter of Educational Psychology, Study Habits, Measurement, Individual Differences, including gifted, subnormal and maladjusted children, Differentiation of Instruction, Learning and Transfer of Training. The book will prove to be most useful as a general survey of the field of educational psychology. In those colleges and universities where teacher training programs include courses in Educational Measurement, and in Non-typical Children, it could hardly be justifiable to use this book as the text in Educational Psychology because of the extent of overlapping of materials with these other courses. Of the seventeen chapters in the book, six are concerned with measurement, starting with the basic principles of statistical treatment of data and then branching into all phases of quantitative determination of educational achievement, — aptitudes, interests, personality traits and aesthetic qualities of individuals.

The authors devote five chapters to the problem of individual differences, and cover the ground which usually makes up the courses in Non-typical and Exceptional children. The old heredity-environment bogey bothers the authors no little, and they treat the problem of intelligence variations in the conventional textbook manner. In one chapter on Differentiating Instruction there are presented some commonly accepted methods of handling the problem of differences, but one won-

ders why the constructive aspect of handling differences in the classroom was not given more consideration after so much effort was expended upon outlining the ways in which children differ.

The problem of learning, as the teacher must face it, is the least adequately treated of the major fields covered in this book. Two chapters, or a total of seventy pages, are concerned with the issues in this problem, and most of the data presented are taken from experimental studies of a non-classroom type. A most laudatory departure from older books is the denial of the "laws of learning," and the substitution of the concept of "description of the conditions influencing learning." For the most part, the point of view emphasized in these descriptions is Thorndikian, and there is little evidence that the authors have been influenced by the so-called "newer" psychology. The final chapter is concerned with transfer of training, and this is a well developed presentation of the problems involved.

Those persons who attempt to limit their courses in Educational Psychology to rather narrow limits of learning and the factors influencing it will wish for a more adequate treatment of this field. However, for those who desire to present a general survey of the whole field of educational psychology, and who do not have to worry about the question of tautologous instruction, this book is a most excellent presentation of psychology in education, written from what we might call a conservative point of view. The difficulty indicated in this connection reaffirms the necessity for educational psychologists adopting a more standardized sequence and organization of courses, so that textbook writers may have something more definite at which to aim.

The book possesses a pleasing style, with an abundance of source material, and with large bibliographical sections at the end of each chapter. It is organized most intelligently from the standpoint of topical headings and logical development. Of especial worth to the student will be the questions which precede each chapter which will guide him in his understanding of the materials which follow.

BERT A. NASH
University of Kansas

MORGAN, JOHN J. B. *Keeping a Sound Mind* (New York: The Macmillan Company, 1934), pp. ix + 440.

Of the many books which have been published recently on mental hygiene, with the purpose of offering reading material with the minimum of technical language, this book is one of the most valuable. The author states in the Preface that this book is addressed to college students and that it is meant to be a basal textbook for courses in mental hygiene.

The style in which it is written makes it quite as valuable for any intelligent reader.

Some students may find fault with some of the philosophy of Dr. Morgan but these faults are perhaps those of mental hygiene in general rather than of the author. For example, the author states in the Preface that most mental diseases arise from faulty adjustments to the problems of life. The majority of psychiatrists, on the contrary, are of the opinion that although neuroses and other emotional maladjustments can generally be traced to difficulties of adjustments and consequent conflicts, mental diseases are significantly different from other forms of emotional deviations.

Much of the material in the book is directed toward therapeutic methods which the individual himself can apply, in addition to discussions of the underlying etiology presented from a scientific

standpoint. It would be interesting to make a systematic study of the effect of the reading and study of such a book upon self-treatment. In general psychiatrists have shown that an individual who develops some emotional or mental difficulty is not able to reorient himself through a knowledge of the causative conditions or through advice which he gathers either from individuals or books. This is because his unconscious conflicts do not allow him to reorient himself and although he may consciously wish to change his habits or attitudes, he is unable to do so.

Psychoanalysts, like Stekel, state for example, that an intellectual knowledge of a basis of a difficulty is of very little value in self therapy. On the other hand, it is possible that the individual with only slight maladjustments or with conflicts which have not been repressed for too long a time may be able to reorient himself through an understanding of his basic problems and the causative conditions. It is therefore probable that this book will be valuable to those individuals who have not yet developed systematic symptoms of a neurotic or emotional nature but those symptoms are isolated and are not as yet projected into a definite physical or mental illness. The individual who is attempting to "find" himself will profit by reading this book.

A very interesting contribution of this book is the emphasis upon the differentiation between conditions which are significant of an internal maladjustment, and those which have social connotations. Thus, in the chapter on "Crime" it is pointed out that social maladjustments in terms of the definition of a crime cannot tell anything about the personality of the individual.

A number of pertinent questions are asked at the end of each chapter which should be of value to the student who wishes to study the problems presented in the book, and should be of value also to the instructor of a course. Thirty references for further reading are given at the end of the book selected mostly from current or recent publications.

MANDEL SHERMAN
University of Chicago

TRILLINGHAM, CLINTON C. *The Organization and Administration of Curriculum Programs.* Southern California Education Monographs, No. 4 (Los Angeles: University of Southern California Press, 1934), pp. xv + 199.

The purpose of this study is to discover and evaluate the procedures in organizing and administering curriculum programs in city school systems. The data were gathered by questionnaire from 100 cities over 25,000 population. The practices reported pertain to the organization of the program; the function of the various participants in the program; the cost of curriculum making; and the appraisal of the program.

This is the third nation-wide study of administrative practices in curriculum revision of city school systems. Mr. Cocking's study made in 1928 included 12 cities and was based on personal interviews and correspondence; Mr. David's study in 1931 included 41 cities and was based on a questionnaire; Mr. Trillingham's study in 1933 included 100 cities and was based on a questionnaire and visits to three cities. Once scarce, the information useful to administrative officials is accumulating in these studies and in the scattered publications of individual school systems. The time is now ripe for the preparation of a compact, simple volume to serve as a reference work for administrative officers who are increas-

ingly recognizing that curriculum making is the most effective means of constructive supervision.

Mr. Trillingham's study being the latest of the three reflects the growth of the curriculum making movement in the number of cities participating in programs of revision; in refinement and expansion of administrative activities; and in the number of special curriculum departments.

Special training for curriculum workers is recommended. It should not be forgotten that curriculum revision is itself the best and most effective kind of inservice training. It has the additional virtue of integrating the ordinarily disjointed educational courses.

To the reviewer who has studied practices as revealed in over 1000 courses of study, Mr. Trillingham's results should be discounted somewhat. For example, he reports that 16 percent of the schools produce different courses of study for the various mental levels, although the actual number that could be isolated would not exceed one dozen or less than 2 percent. Again, the author's data show that over 50 percent of the school systems base new courses of study upon investigations of community needs and pupil interests; and upon experimentation. The reviewer's data show that the amount of curriculum research and experimentation revealed in the courses of study themselves does not exceed 10 percent.

Despite the limitations of this questionnaire study, it is a very convenient and useful reference book for the administrator, the curriculum worker, and the instructor of prospective administrative officers.

HENRY HARAP
Western Reserve University

HAGBOLDT, PETER. *Language Learning: Some Reflections from Teaching Experience* (Chicago: University of Chicago Press, 1935), pp. ix + 166.

This is a useful book which summarizes what we know about language learning, and more important, presents it with ample illustrations so that the teacher can apply it. It can therefore be confidently commended to teachers for practical use. The book makes a good impression typographically. I noted only one printer's error *condicio* for *conditio* on page 69. Contents are as follows: Chapter I, Basic Concepts of the Problem; Chapter II, Psychological Principles; Chapter III, Language in Function; Chapter IV, Looking Back.

There will be little dissent from his general facts and principles. We may however call attention to a few matters of practical importance. For instance, under the heading *Analogy* he calls attention to the many sentences one can form on a sentence pattern by substituting other objects, subjects, etc. While attention has been called to this by others before him, it is dangerous for teachers to go very far in this direction unless they wish to run the risk of killing interest. It amounts really, as Hagboldt, Palmer, and West give the scheme, to a drill on verbs with varying nouns, pronouns, possessives, etc. Other teachers used only the pronouns and we know how fatal this was to interest. The value we can get from such "building blocks" of language is by calling the student's attention to the type patterns as units which the student must master if he wishes proficiency. But there are many more patterns than Hagboldt mentions. We can use e.g., the sliding synopsis of the verb and along with each form use

an appropriate adverb(s), or adverbial phrase, to suit the tense, etc.; or we can use prepositions with the personal pronouns as they follow in the paradigm, etc., or we can use along with the sliding synopsis the proper possessive adjective to accompany the noun used in each, etc. All of these are however grammatical exercises and we know that these drills to be effective must be short and must call for invention of parts of the sentence by the student.

In his psychological hints to students (p. 84) Hagboldt should not follow only the beaten paths but extend these valuable hints. For instance there is the matter of spacing his reviews on the part of the student; of reading not only aloud; but when he gets tired of this, of moving the lips, which is better than the mere kinesthetic speaking; also how to derive most value from writing down meanings he has had to look up, not interlinearly because to see these would mean *recognition* only, but not *recall* et cetera.

Hagboldt does not take up as important a question as the sectioning of classes into fast and slow sections at all. This in our practice is as important as any device or principle which he mentions. In fact we can determine neither the aims of the course nor the methods to be used before we know something of the calibre of the class. Both aims and methods would necessarily be quite different in a fast, a slow, or a mixed section from the first day, when we begin with teaching pronunciation, to the end.

The range of studies and authorities quoted and excepted is wide but not wide enough. Of his own entourage, for instance, which he knows best, he has omitted reference to Buswell's significant study of the eye fixations in silent reading.

He tried to keep a wise balance as between extensive reading for content and intensive reading for mastery, and does very well at it. Here too there are numerous devices for the teacher which might have been mentioned e.g., the use of large amounts of reading day by day for vocabulary acquisition, skill in getting the meaning from the page, and the assignment each day of the first page of the assignment for accurate translation and for controlled speaking exercises, etc., in order to insure the acquisition of habits of accuracy.

Miami University C. H. HANDSCHIN

RESEARCH ABSTRACTS and BIBLIOGRAPHIES

Address all communications relative to research abstracts and bibliographies to A. S. Barr, University of Wisconsin, Madison, Wisconsin.

BULLETINS

ALEXANDER, CARTER AND OTHERS. "Finance and Business Administration," *Review of Educational Research*, No. 2 (Washington: American Educational Research Association, 1932), 85 pp.

This summary of educational research contains chapters on public-school accounting, public-school budget, revenues and taxation, public relations, research and survey technics, finance and business management, fiscal control and textbooks in business management, financial economics, and state and federal aid. Bibliography.

BAKER, HARRY J., AND OTHERS. "Psychological Tests," *Review of Educational Research*, No. 3 (Washington: American Educational Research Association, 1935), 146 pp.

This bulletin contains chapters on intelligence and its measurement, applications of intelligence testing, measures of aptitude, test construction and statistical interpretation, general survey of the field of character and personality measurement, mental hygiene and emotional adjustment, social attitudes, and measures of character and personality through conduct and information. Bibliography.

BUROS, OSCAR K. *Educational, Psychological and Personality Tests of 1933 and 1934*, Studies in Education, No. 7 (New Brunswick, New Jersey: School of Education, Rutgers University, 1935), 44 pp.

The author presents an annotated bibliography of tests for the years 1933 and 1934: scope of bibliography, information given for each test, key to classification of tests, bibliography of tests, directory of publishers, index by titles, and index by authors.

CHAMBERS, M. M., AND OTHERS. *The Third Yearbook of School Law* (Washington: 722 Jackson Place, 1935), 119 pp.

The third yearbook of school law contains chapters on the rights and duties of pupils and parents; teachers: certification, tenure, etc.; local district boards and officers; county school administration; acquisition of real property for school purposes; school contracts; tort liability of school districts and of school personnel; school district debts; taxation for public education; creation and alteration of school districts; state school administration; and higher education.

ELWOOD, MARY I. "A Statistical Study of the Results of the Stanford Revision of the Binet-Simon Scale," *Pittsburgh Schools*, No. 4 (Pittsburgh, Pennsylvania: Board of Public Education, March-April, 1935), pp. 116-140.

The author presents data relating to the difficulty of sub-tests and parts of

sub-tests, comparison of successes scored by normal children with those scores by subnormal children of the same mental age, effects of short cuts in testing, etc.

HOLZINGER, KARL J. *Preliminary Report on Spearman-Holzinger Unitary Trait Study:* No. 1, Raw Correlations, Reliabilities, Means, and Standard Deviations for seventy-eight variables, using a Sample of 118 Cases; No. 2, Intercorrelations from Re-scoring Tests, Correlations with "g", Means and Standard Deviations for Boys and Girls, Preliminary Analyses of Speed and Verbal Tests, Using Thorp Data, 118 Cases; No. 3, Raw Correlations, Correlations Corrected for Age, Reliabilities, Means, and Standard Deviations for Mooseheart Sample of 100 Cases, Comparison of Thorp and Mooseheart Reliabilities, Age Correlations and Basic Tetrads for Correlations with "g"; No. 4, Factor Patterns and Residual Correlations for Thorp and Mooseheart Data; and No. 5, Introduction to Bi-Factor Theory, Solid and Hollow Staircase Patterns for Sets of Data from Mooseheart (Chicago: Department of Education, University of Chicago, 1935), 27 pp.; 26 pp.; 37 pp.; 78 pp.; 57 pp.; respectively.

These reports supply a record of progress on the unitary trait study of the statistical laboratories of the University of Chicago. The fiscal publication of results will appear later.

LONG, JOHN A., SANDIFORD, PETER, AND OTHERS. *The Validation of Test Items,* Bulletin No. 3 (Toronto: Department of Educational Research, Ontario College of Education, 1935), 126 pp.

The author explains the various item-validity techniques and presents data from which he concludes that test techniques using such methods as the upper-lower third, the McCall-Long-Bliss, etc., which tends to discriminate in favor of items of 50 percent difficulty appear to be superior to techniques such as Bi-serial r, Kelley, etc.

MANWILLER, CHARLES E. "Results of Brueckner Diagnostic Test in Fractions and Decimals," *Pittsburgh Schools,* No. 5 (Pittsburgh: Board of Public Education, 1935), pp. 157-175.

The author presents a detailed analysis of difficulties in addition, subtraction, multiplication, etc., of fractions and decimals for the Brueckner Diagnostic Test in Fractions and Decimals.

SCRUGGS, SHERMAN D. *Effect of Improvement in Reading Upon the Intelligence of Negro Children,* Bulletin of Education (Kansas City, Kansas: University of Kansas, 1935), 29 pp.

The author presents data relative to 202 pupils of the fifth grade in ten classes in six Negro elementary schools of Kansas City, Kansas, from which he concludes that reading exercises produce not only an improvement in the reading ability of pupils but an improvement in their intelligence, as measured by the test of intelligence employed in this investigation.

SEIPT, IRENE S., AND OTHERS. *The Scientist Looks at the Emotionally Unstable Child,* Parts I and II, Child Research Clinic Series (Langhorne, Pennsylvania: Child Research Clinic, The Woods School, 1935), 22 pp., each.

These two bulletins contain four studies of the emotionally unstable child: be-

havior problems in children, the endocrine aspects of emotionally unstable children, family situations in relation to the emotionally unstable child, and play techniques in child analysis.

SMITH, C. EBBLEWHITE. *The Construction and Validation of a Group Test of Intelligence using the Spearman Technique*, Bulletin No. 5 (Toronto 5: Department of Educational Research, Ontario College of Education, 1935), 56 pp.

The author after discussing the problem of measurements presents data relating to the first trial run of a test of intelligence, a second trial, the experimental edition, the preparation of the final edition, and norms. Bibliography.

ADMINISTRATION AND SUPERVISION

TOWNER, EARL M. "The Formal Rating of Elementary-School Principals," *Elementary School Journal*, XXXV (June, 1935), pp. 735-746.

The author presents the results of a questionnaire sent to 191 cities on practices relating to principals.

WALLIN, J. E. WALLACE. "The Support of Fresh-Air Classes during the Economic Depression," *Elementary School Journal*, XXXV (April, 1935), pp. 597-605.

The author presents the results of a questionnaire to 29 mid-western, eastern and southern cities on the support of fresh-air classes during the depression.

WATERMAN, IVAN R., AND MELBO, IRVING R. "A Plan of Procedure for the Evaluation of Textbooks in Reading," *Elementary School Journal*, XXXV (May, 1935), pp. 662-674.

The authors present a discussion with appropriate illustrative materials of the work of the California State Curriculum Commission in the selection of school textbooks.

METHODS

FILDES, R. E. "Blackboards and Their Use," *Elementary School Journal*, XXXV (June, 1935), pp. 760-767.

The author presents the data for the uses of the blackboard made by 100 elementary school teachers based upon a detailed record of the uses of the blackboard made by those teachers for a period of one week.

HARTMAN, GEORGE W. "Comparative Pupil Gains under Individual Conference and Classroom Instruction," *Journal of Educational Psychology*, XXVI (May, 1935), pp. 367-372.

The author presents the results of an experimental study of the individual and class methods of teaching educational psychology in which he finds that in five out of six measures of pupil achievement the class method group did better work.

OTTO, HENRY J., AND MELBY, ERNEST O. "An Attempt to Evaluate the Threat of Failure as a Factor in Achievement," *Elementary School Journal*, XXXV (April, 1935), pp. 588-596.

The authors report the results of an experimental study conducted with 352 pupils and 18 classes in four typical school systems of northern Illinois from which they conclude that children who are told that they will be in the following grade next semester do as well as those who are reminded that they must do good work or fail.

POTTHOFF, EDWARD F. "Teaching Combinations: Reductio ad Absurdum," *School Review*, XLIII (June, 1935), pp. 417-427.

From a study of teaching combinations of 3490 teachers in the 525 public high schools in the State of Illinois, the author finds very little standardization and a serious situation for the training and improvement of teaching.

WEEDE, ROBERT O., AND GILBERT, LUTHER C. "Vocabulary Growth in American History in the Secondary School," *School Review*, XLIII (June, 1935), pp. 440-445.

The author presents the results of the application of two forms of a word meaning test, emphasizing the importance of vocabulary in the study of history.

CURRICULUM

FREEMAN, FRANK N. "An Analysis of the Basis of the Activity Curriculum," *Elementary School Journal*, XXXV (May, 1935), pp. 655-661.

The author presents a critical analysis of the activity concept.

GEOGHEGAN, PATRICIA S., AND FITZGERALD, JAMES A. "Composition Errors in Letters Written by Children outside the School," *Elementary School Journal*, XXXV (June, 1935), pp. 768-775.

The authors present an analysis of the composition errors of 4500 letters written by children outside of school.

POWERS, H. W. "The Offering in Trade, Vocational, and Technical Schools," *School Review*, XLIII (May, 1935), pp. 337-349.

The author presents an analysis of the curriculum offerings in a selected group of ninety-three trade and vocational schools.

WRIGHTSTONE, J. WAYNE. "An Evaluation of the Integrated Curriculum in the Upper Grades," *Elementary School Journal*, XXXV (June, 1935), pp. 583-587.

From a study of the achievement of pupils in the new-type and standard type schools, the author concludes that the newer practices are as adequate as the standard practices for the acquisition of the skills and habits of the instrumental subjects of reading, language, and arithmetic.

MEASUREMENTS, STATISTICS, AND SCIENTIFIC TECHNIQUES

ANDERSON, JOHN E. "The Effect of Item Analysis upon the Discriminative Power of an Examination," *Journal of Applied Psychology*, XIX (June, 1935), pp. 237-244.

From a comparison of the scores made on the rejected and retained items with the score made on the total test and other criteria, the author finds that the rejected items have lower reliability and validity.

CARNEY, LANDIS; ZUBIN, JOSEPH, AND KATZ, SIEGFRIED E. "Empirical Evaluation of Three Personality Adjustment Inventories," *Journal of Educational Psychology*, XXVI (May, 1935), pp. 321-330.

The authors offer data on the validity of the Bernreuter Personality Inventory, the Page Questionnaire of Schizophrenic Traits, and the Maller Character Sketches.

DEWEY, JOSEPH C. "The Validity of Standardized Spelling Scales," *Elementary School Journal*, XXXV (May, 1935), pp. 675-681.

The author presents data to show that standardized spelling scales frequently lack curricular validity for particular pupils and classes.

LORGE, IRVING. "Personality Traits by Fiat. I. The Analysis of the Total Trait Scores and Keys of the Bernreuter Personality Inventory," *Journal of Educational Psychology*, XXVI (April, 1935), pp. 273-278.

The author presents a statistical study of the Bernreuter Personality Inventory.

STRONG, EDWARD K., JR. "Predictive Value of the Vocational Interest Test," *Journal of Educational Psychology*, XXVI (May, 1935), pp. 331-349.

The author presents data on the agreement of the responses of 223 men who responded in the Strong Vocational Interest Test in 1927 and 1932 in which he finds that one-half of college seniors change their occupations within five years after graduation.

MISCELLANEOUS

FORAN, T. G., AND O'HARA, BROTHER COLOMBIERE. "Sex Differences in Achievement in High-School Geometry," *School Review*, XLIII (May, 1935), pp. 357-362.

After presenting a summary of previous investigations, the authors present data for 486 boys and 501 girls from which they conclude that boys excel girls in achievement in plane geometry in all of the phases included in the Webb Geometry Test with the exception of knowledge of fundamental definitions in which the two groups are about equal.

MCSWAIN, E. T., AND ALEXANDER, CARTER. "Guide to the Literature on Elementary Education," *Elementary School Journal*, XXXV (June, 1935), pp. 747-759.

A listing of the sources of material relating to elementary education.

SHANNON, J. R. "Demonstration Teaching and Directed Observation," *Educational Method*, XIV (April, 1935), pp. 355-362.

The author discusses the purposes, forms, and manner of conducting demonstration teaching from an analysis of thirty-one of the best studies of this subject.

SMITH, DORA V., AND OTHERS. "The Contributions of Research to Teaching and Curriculum-Making in English, January, 1933, through June, 1934: III. Reading," *English Journal*, XXIV (June, 1935), pp. 451-461.

The third installment of the summary of researches relating to the teaching of English prepared by the research committee of the National Council of Teachers of English.

SMITH, DORA V., AND OTHERS. "The Contributions of Research to Teaching and Curriculum-Making in English, January, 1933, through June, 1934: II. Literature and Recreational Reading," *English Journal*, XXIV (May, 1935), pp. 363-374.

The second installment of the summary of researches relating to the teaching of English.

NEW TESTS

BRUNER, HERBERT B., AND LINDEN, ARTHUR V. *A Tentative Check List for Determining the Positions Held by*

Students on Forty Crucial World Problems. New York: Bureau of Publications, Teachers College, Columbia University, 1935.

The purpose of this check list is to assist individuals to determine their own attitude toward some of the more important social, economic, and political issues.

Chicago City Junior Colleges Comprehensive Examination: Test 1, Social Science; Test 2, Biological Science; Test 3, English; Test 4, Physical Science. Chicago: Board of Education, 1935.

These tests present a series of comprehensive measurements of achievement in certain of the basic subjects at the junior college level.

DAVIS, IRA C., AND OTHERS. *Tests for Understanding of the Scientific Method* (Form A). Madison, Wisconsin: Wisconsin Educational Association, Insurance Building, 1935.

The authors of these tests present a series of problems in which students are asked to recognize and control important factors for their solution.

DOLCH, E. W., AND GRAY, W. S. *Basic Reading Tests:* Word-Recognition Series. Chicago: Scott, Foresman and Company, 1935.

The purpose of this test is to help the teacher discover the progress and needs of individual children in the recognition of basic words.

Home Information Blank, prepared by Lincoln School Staff. New York: Bureau of Publications, Teachers College, Columbia University, 1935.

The purpose of this blank is to supply a comprehensive picture of the home background of the child.

LINDQUIST, E. F., AND OTHERS. *Iowa Every-Pupil Tests of Basic Skills in Reading, Study, and Language,* Grades 6, 7, and 8: Test A, Silent Reading Comprehension; Test B, Vocabulary, Basic Study Skills (prepared by J. Lloyd Rogers); Test C, Basic Language Skills (prepared by H. A. Greene). Iowa City, Iowa: State University of Iowa, 1935.

The authors present a series of tests illustrative of the materials employed in coöperative testing of the educational achievement of pupils in the state of Iowa.

ORLEANS, JACOB S., AND OTHERS. *Metropolitan Achievement Tests:* Primary I Battery for Grade 1; Primary II for Grades 2-3; Intermediate Battery for Grades 4-6; and Advanced Battery for Grades 7-8. Yonkers-on-Hudson: World Book Company, 1935.

These tests offer a new series of measures for the continuous measurement of achievement in all subjects in grades 1 through 8.

RESEARCH NEWS and COMMUNICATIONS

Address all research news and communications to Carter V. Good, Teachers College, University of Cincinnati, Cincinnati, Ohio.

Research Division, N.E.A.—"Education stands at the threshold of a period of reconstruction. . . . It will not suffice to rebuild what has been destroyed—to regain what has been lost. Fundamental changes must be introduced so that the school may have a vital part in the social and economic readjustments now in progress." This quotation is from the Foreword of the January *Research Bulletin* which deals with one phase of the problem of reconstruction,—the provision of suitable schoolhousing facilities. Entitled "The Nation's School Building Needs," this issue gives a general overview of the school-building situation at the present time, and points out the unusual opportunity that school-building construction offers to stimulate economic recovery through permanent and socially desirable public-works projects.

Another problem of educational reconstruction is restoring the compensation of teachers to a professional basis. The findings of the March *Research Bulletin* show a continuing decrease in the salaries paid in most city school systems. This survey of the salaries of school employees for the school year, 1934-35, is the seventh biennial report issued, and presents data on almost 400,000 school employees in 1989 cities. The facts in it should form the basis for state and local studies to develop adequate and equitable salary schedules for teachers.

A third phase of educational recovery is that of improving and vitalizing the curriculum, and of preparing individuals for complete living. Social-economic education must be recognized as an essential part of the educational program. Some schools and school systems have developed noteworthy programs of social and civic training. As a first step in the direction of providing a central finding-list of such schools, a report has been prepared by the Research Division for the Committee on Social-Economic Goals of America (Fred J. Kelly, chairman) and simultaneously issued as the May *Research Bulletin*. In order to secure an overview of present practices, the bibliographic method was followed. The report, therefore, consists of a descriptive bibliography of social-economic education in 170 schools and school systems, 1928-35.

In November, 1934, the Research Division issued a series of statements describing briefly the school revenue and apportionment systems of ten states through June, 1934. In January, 1935, a second pamphlet appeared describing the systems of financing public elementary and secondary school systems in fifteen additional states. This series, entitled "School Finance Systems," is prepared with the coöperation of authorities on school finance in the several states.

The Research Division has also continued to coöperate in an editorial and consultative capacity with regard to the publications of certain departments of the National Education Association. Current issues of the *Review of Educational*

Research published by the American Educational Research Association comprise these titles:

1. "Psychology and Methods in the High School and College," Vol. 4, No. 5, December, 1934.
2. "Special Methods and Psychology of the Elementary-School Subjects," Vol. 5, No. 1, February, 1935.
3. "Finance and Business Administration," Vol. 5, No. 2, April, 1935.
4. "Psychological Tests," Vol. 5, No. 3, June, 1935.

The Thirteenth Yearbook of the Department of Superintendence entitled "Social Change and Education" was issued in February. It recognizes a need for a presentation of social thinking that will help bridge the gap between theoretical discussions of society and the practical demands of the classroom. The yearbook is, therefore, neither a treatise on sociology nor an outline of a social studies curriculum. The first seven chapters review the nature of recent social trends and summarize the efforts of society to adjust to change. The other eight chapters point out some of the implications for education of social and economic adjustments.

The Educational Research Service, maintained by the Research Division and the Department of Superintendence, has issued these circulars in 1935:

1. "Education Discussed in Lay Magazines," Circulars No. 1 and 4, 1935. These two summaries of articles in non-educational magazines cover the period from December 1, 1934, to April 1, 1935.
2. "Teachers' Salaries in Suburban School Systems, 1934-35," Circular No. 2, March, 1935. The larger part of the circular consists of a detailed tabulation reporting on median salaries and certain other statistics, for all cities in the forty-six metropolitan districts on which the figures are available. Table 2 gives corresponding information for non-suburban school systems in cities below 100,000 in population which subscribe to the Educational Research Service.
3. "State School Legislation, 1934," Circular No. 3, 1935. This circular is a digest of legislation arranged according to nine topics.
4. "Recent Trends in Public Educational Expenditures and Other Governmental Expenditures," Circular No. 5, April, 1935. This circular brings together certain recent findings concerning expenditures for public education and the combined expenditures for other governmental services.

This department is indebted for the preceding summary statement to W. G. Carr, director of the Research Division.

Social Intelligence. — In December, 1933, a committee of the National Education Association on the social-economic goals of America, with F. J. Kelly as chairman, set forth ten such goals:

1. Hereditary strength
2. Physical security
3. Participation in an evolving culture
   a. Skills, technics, and knowledge
   b. Values, standards, and outlooks
4. An active, flexible personality
   a. Personal initiative
   b. Discriminating judgment and choice
   c. Flexibility of thought and conduct
   d. Individual differences
   e. Coöperativeness
5. Suitable occupation
   a. Guidance
   b. Training
   c. Placement and advancement
6. Economic security
7. Mental security
8. Equality of opportunity
9. Freedom
10. Fair play

The *Research Bulletin of the National Education Association*, May, 1935, as indicated elsewhere in this department, is a descriptive bibliography of 265 references on "Creating Social Intelligence," reporting some of the outstanding work

of the schools which is consciously directed to the attainment of social, economic, and civic objectives.

Psychological Tests.—Those who may be of the opinion that the testing movement has lost some of its impetus of a few years ago will find it necessary to correct such an impression on examination of the June, 1935, number of the *Review of Educational Research*, which covers 1033 references dealing with psychological tests (intelligence, aptitude, personality, and character) during the last three-year period.

The next five numbers of the *Review* will summarize research in the following areas: buildings, grounds, equipment, and supplies, October, 1935; educational tests, December, 1935; mental and physical development of children, February, 1936; student accounting, personnel, and guidance, April, 1936; and psychology of learning, general methods, and supervision, June, 1936.

Yearbook of Classroom Teachers.—The ninth yearbook of the Department of Classroom Teachers of the National Education Association deals with the health of the teacher and is to be ready in June, 1936. The chairman of the Committee in charge is Mary D. Barnes of Elizabeth, New Jersey. The topics to be treated include: a summary of the literature on this subject; the teacher's health in relation to pupil, instruction, administration, and community; treatment and training of teachers as they affect health; selection of teachers and state laws relating to their health; school environmental conditions; personal health practices; non-school environmental factors; spiritual factors; and the work of professional organizations and school communities in the interests of the health of teachers.

Yearbook of School Law.—The *Third Yearbook of School Law*, 1935, edited and published by M. M. Chambers, 722 Jackson Place, Washington, D. C., is a narrative topical summary of decisions of the higher courts in all states of the United States of America in cases involving school law, as reported during the preceding year. The topics covered are as follows: the rights and duties of pupils and parents; teachers: certification, appointment, the teacher's contract; teachers: tenure, retirement, workmen's compensation; tenure in New York State; local district boards and officers; county school administration; acquisition of real property for school purposes; school contracts, other than for teaching services; the tort liability of school districts and of school personnel; school district debts; taxation for public education; the creation and alteration of school districts; state school administration; and higher education. Thirteen other persons prepared sections of the Yearbook. The fourth yearbook will appear early in 1936.

The Workbook.—The Society for Curriculum Study has issued a yearbook on *The Workbook* as the April 22, 1935, number of the *Curriculum Journal*, official organ of the Society. The contributors to the yearbook are: H. G. Good, Wendell Vreeland, Arthur I. Gates, Angela M. Broening, Bess Goodykoontz, L. J. Brueckner, Carter V. Good, and S. A. Courtis, Chairman.

Curriculum Committees.—The Society for Curriculum Study has at work committees dealing with a number of important areas and problems: course of study, textbooks, new economic materials, teacher-training, bibliography, the place of tests, higher education, the city school curriculum, integration, and state-wide curriculum programs. The May 22, 1935

number of the *Curriculum Journal* contains reports of the membership and work of these committees.

The Committee on Courses of Study, under H. B. Bruner, collects annually from 3000 to 4000 courses of study, evaluates them, and publishes a selected list in the *Curriculum Journal*.

The Committee on Textbooks, with M. E. Herriott as chairman, publishes in the *Curriculum Journal* an annual list of new textbooks, stressing the elementary and secondary school levels.

The Committee on Teacher Training, under the chairmanship of R. D. Bennett, is attempting to promote and coördinate research in seven areas:

Assembling curriculum materials in psychology, physiology, sociology and other related fields which should be included in the professional training of prospective teachers; problems related to the four-year curriculum for elementary teachers; the pattern of training appropriate for the five-year curriculum for secondary teachers; compilation of a list of problems concerned with teacher-training curricula in which research is needed; the General College curriculum, as the first half of the four-year teacher-training curriculum; the setting up of goals in teacher education to serve as guides in selection and organization of curriculum material; and special adaptations of the teacher-training curriculum for very superior students.

The Committee on Bibliography, under Edgar Dale, prepares an annual bibliography on the curriculum, which is published in the *Curriculum Journal*.

The Committee on Higher Education, with W. E. Peik as chairman, expects to prepare an overview of the extent of curriculum reorganization taking place, to formulate a statement of curriculum issues in higher education, and to divide these issues into two groups (those on which there is common agreement and those on which there is difference of opinion).

The Committee on State-Wide Curriculum Programs, under Paul R. Hanna, is making a survey of all states and territories of the United States for the following purposes: (1) to make available a cross section of the curriculum practices of the forty-eight states and the territories; (2) to discover the fundamental objectives of state curriculum programs; (3) to point out and to elaborate basic philosophies and practices which seem significant; and (4) to give more detailed information about some of the more promising innovations and features of certain state curriculum programs. The scope of the study will involve such topics as: (1) the organization of the state department of education and of the entire state system of education to discharge the function of curriculum making; (2) the organization of allied educational and lay agencies for participation in curriculum making; (3) the functions of the state department of education in curriculum making; (4) the social philosophy underlying the state curriculum program; (5) the fundamental objectives of a state program; (6) the curriculum and its contents; and (7) the installation and administration of the curriculum.

American Council on Education.—The annual report of the Director (the new title is President), George F. Zook, of the American Council on Education is published in the July, 1935, number of the *Educational Record*. This report outlines the work of the various committees of the Council. The grants received during the fiscal year closing April 30, 1935, were as follows:

From the Carnegie Corporation, a grant of $4,500 for a study of library facilities in education in Washington.

From the Carnegie Foundation for the Advancement of Teaching, a grant of $5,000 for the continuation of certain

studies related to the survey of modern language teaching.

From the General Education Board, for the use of the Office of Education, a grant of $40,000 for the preparation of study materials for use in the Civilian Conservation Corps Camps.

From the General Education Board, for the use of the Office of Education, a grant of $30,000 for a study of the Youth Problem.

From the General Education Board, for the use of the Committee of Twenty-One of the Regional Accrediting Associations, a grant of $25,000 for a study of the formulation of tentative standards or guiding principles of secondary education.

From the General Education Board, a grant of $500,000 for overhead expenses of a study of the care and education of American Youth.

From the Josiah Macy, Jr., Foundation, a grant of $5,000 for continued work of the Committee on the Relation of Emotions to the Educative Process.

From the Payne Fund, a grant of $7,500 for preliminary study in connection with the possible establishment of a national educational film institute.

A total of $617,000 for the year.

Teachers of English.—The teaching of English in a changing curriculum is the general topic for the silver anniversary meeting of the National Council of Teachers of English to be held in Indianapolis, November 28-30, according to announcement made by the president, Charles Swain Thomas of Harvard University. The general session on Friday morning will be concerned with the new silent reading movement in the schools. A special session on Saturday will be devoted to discussion of the long-awaited report of the Curriculum Commission of the National Council, just published under the title, *An Experience Curriculum in English*. W. Wilbur Hatfield of Chicago Normal College, chairman of the Commission, will preside. Because of the unique importance of the Commission's work in outlining a pattern curriculum in English from kindergarten through high school this session will be of wide interest. Sectional meetings on college reading, articulation, international relations, creative writing, departmental organization, journalism, speech and dramatics, language problems, radio, research, and other topics will occupy Friday afternoon. All who are interested in research and in current educational problems are invited to attend the convention whether or not they are members of the National Council.

Conference on Higher Education.—The University of Oklahoma announces a Southwestern Conference on Higher Education, to be held at Norman, November 14-16, 1935, on the general subject of "Higher Education and Society." Educators among the guest speakers invited for the public sessions are Boyd H. Bode of Ohio State University, William F. Ogburn of the University of Chicago, Kathryn McHale of the American Association of University Women, and W. A. Jessup of the Carnegie Foundation. Institutions of higher learning in Oklahoma, Missouri, Kansas, Colorado, New Mexico, Texas, Louisiana, and Arkansas have been invited to participate.

Administrators' Conference.—More than 1000 persons from 36 states attended the Sixth Annual School Administrators' Conference, sponsored by the Department of School Administration at George Peabody College for Teachers, under the direction of Dennis H. Cooke and Ray L. Hamon, June 24-26.

The general theme for the Conference was concerned with "Current Problems in School Finance, Public Relations, the Teaching Staff, Curriculum, Child Accounting, and the School Plant." As an

outgrowth of an address by Superintendent Pulliam, the Conference went on record as favoring and requesting a larger degree of participation by the federal government in the support of public education.

William T. Harris. — The September number of the *International Education Review* consists of nine articles commemorating the 100th anniversary of the birth of William Torrey Harris, who was United States Commissioner of Education and one of America's truly great educators at a time when friends of public education were not so numerous as now. Harris died in 1909.

New Psychological Journal. — A new publication, "to promote a knowledge of the applications of individual psychology in the fields of psychiatry, medicine, psychology, pedagogy, criminology, and social work," is announced under the title of *International Journal of Individual Psychology*, with Alfred Adler as editor-in-chief.

The Journal is published in Chicago by International Publications and is in the nature of an English counterpart of the *Internationale Zeitschrift fur Individual Psychologie*, a German publication, which Dr. Adler and his associates have issued in Vienna since 1913. Dr. Adler is now occupying the chair of Medical Psychology at Long Island Medical College, and has already taken first steps toward becoming an American citizen.

Publications on Child Welfare.—The *Publications of the Iowa Child Welfare Research Station, 1917-1935*, a total of 360, are listed in a bulletin of the State University of Iowa, New Series No. 767, November 24, 1934. The subdivisions of the bibliography are as follows: general development and methodology, nutrition, physical growth and anthropometry, child psychology, preschool education, parent education, character education, coöperative studies, reviews and abstracts, and descriptions and popular bulletins. An author index is included. The present director is George D. Stoddard who succeeded the late Bird T. Baldwin.

Research at the University of Toronto. —For several years one of the major problems of the Department of Educational Research at the University of Toronto, whose director is Peter Sandiford, has been the analysis of the fundamental bases of test construction. This interest is represented especially in the fifth of a series of bulletins published by the Department:

No. 1. *On the Counting of New Words in Textbooks for Teaching Foreign Languages.* E. Swenson and M. P. West, 1934.
No. 2. *A Critical Examination of Basic English.* M. P. West, E. Swenson and others, 1934.
No. 3. *The Validation of Test Items.* John A. Long and Peter Sandiford, 1935.
No. 4. *Definition Vocabulary.* Michael West, 1935.
No. 5. *The Construction and Validation of a Group Test of Intelligence Using the Spearman Technique.* C. Ebblewhite Smith, 1935.

The establishment of the Department of Educational Research was made possible in 1931 by grants from the Carnegie Corporation of New York.

Needed Research in New York State.— The State Education Department of New York State has continued a rather unusual educational service by issuing a third bulletin pointing out *Needed Educational Research in New York State*. It was prepared by the staff of the Educa-

tional Research Division under the direction of the Committee on Coöperation in Educational Research, of which G. D. Strayer of Teachers College, Columbia University, is chairman. The bulletin includes a list of 318 studies recently completed, with a bearing on educational problems in New York State. The problems for investigation are listed under the headings of: historical studies, special methods of instruction and organization, educational psychology and child study, tests and testing, special subjects of curriculum, preschool education, secondary education, teacher education, professional status of teachers, higher education, school administration, school management, health and physical education, social aspects of education, moral and religious education, manual and vocational education, professional education, educational and vocational guidance, exceptional children, and libraries and reading.

Research in Ohio. — The Educational Research Department of the Ohio Education Association has issued its annual mimeographed booklet, reporting investigations completed, studies under way, and publications by members of the Department. Copies are obtainable from Josephine MacLatchy of Ohio State University at Columbus.

National Survey of the Education of Teachers. — Upon authorization of Congress, and under direction of the United States Commissioner of Education, the Federal Office of Education conducted a 3-year investigation of teacher education in the United States. Final reports now off the press contain data collected from more than 1,000 teacher-preparation or other institutions of higher learning, nearly one-fourth of the college staff members in the country, and from approximately half of the public-school teachers in the United States.

Vol. I, *Selected Bibliography on the Education of Teachers*, 118 pages. Price 15 cents. 1,297 selected and annotated references, indexed by authors and subjects.

Vol. II, *Teacher Personnel in the United States*, 225 pages. Price 25 cents. Teacher personnel in public schools of the United States, student personnel-prospective teachers, and staff personnel of higher educational institutions.

Vol. III, *Teacher Education Curricula*, 547 pages. Price 60 cents. Curricula of normal schools and teachers colleges, teacher-education curricula in universities, colleges, and junior colleges, the training school in the education of teachers, summer sessions for teachers, graduate work in the education of teachers, educational philosophies held by faculty members in schools for professional education of teachers.

Vol. IV, *Education of Negro Teachers in the United States*, 123 pages. Price 10 cents. Eight chapters on outstanding problems in teacher preparation.

Vol. V, *Special Survey Studies in Education of Teachers*, 484 pages. Price 60 cents. History of the professional education of teachers in the United States, the education of teachers evaluated through measurement of teaching ability, student welfare and extracurriculum activities, library facilities of teachers colleges, reading interests of teachers, in-service education of teachers, preparation of teachers for small rural schools, training of teachers in Europe, and summary of coöperative studies in education of teachers.

Vol. VI, *Summary and Interpretation*, 253 pages. A summary and interpretation of the entire survey report prepared by the associate director of the Survey, E. S. Evenden.

Graduate Study. — Bulletin No. 20, 1934, of the United States Office of Edu-

edition, by Walton C. John, is an extensive and valuable analysis of *Graduate Study in Universities and Colleges in the United States*. It is pointed out that with the extraordinary expansion of such fields as agriculture, industry, commerce, and education, graduate study and research turned in the direction of applications of truth and knowledge to immediate problems rather than toward general principles. This meant the study of many local and regional problems and the development of research in American institutions rather than to attend German and French universities. Such factors explain in a large measure the decrease in emphasis on foreign languages as requirements for the Ph.D. degree and the establishment of professionalized Doctors' degrees such as Ed.D., Sc.D., Eng.D., J.S.D., etc.

The report maintains that there has been considerable overexpansion of graduate departments in American institutions, raising a question as to how many of the 75 or more universities and colleges which grant the Ph.D. degree should do so and to what extent work should be duplicated. Undoubtedly five or ten strong centers in a highly specialized field would be much better than fifty weak departments covering this area. The Master's degree is awarded by 160 schools.

It is pointed out that the discovery each year of some 3,000 Doctors' problems and of 12,000 Masters' topics is a matter of no small significance, suggesting that the graduate student in many instances must do considerable searching before locating an acceptable thesis problem.

The foregoing facts imply that a rather difficult problem of articulation exists between the graduate institutions and some 1,000 undergraduate colleges. The choice of a graduate school requires real thought and guidance, for which some assistance is available in the classified lists of higher institutions prepared by the Association of American Universities, and in the reports prepared by R. M. Hughes for the American Council on Education.

Doctors' Studies Deposited with the Office of Education. — Pamphlet No. 60 of the United States Office of Education is a list of 797 *Doctors' Theses in Education* on file with the Office for interlibrary loan, arranged alphabetically by author, subject and institution. The total number of Masters' and Doctors' theses deposited with the Office of Education was 1727 at the time of publication of Pamphlet No. 60.

Thesis Collection in the Office of Education. — The thesis collection to which reference has been made in another part of this department is described at some length by Ruth A. Gray in the following paragraphs.

Since 1926 when the Office of Education began its series of annual bibliographies of research in education, a large proportion of the entries each year have been Masters' and Doctors' theses. Naturally there have been many requests to borrow the theses and inquiries as to how they could be secured. Accordingly in August, 1930, the Office of Education requested the schools of education of the colleges and universities granting graduate degrees, to place copies of their Doctors' theses and outstanding Masters' theses in the library, where they would be on file and available for interlibrary loan. Since that time, a total of 1,748 theses in the field of education, and a few on general subjects, have been received. The accompanying table shows the general classification of the theses, although there is much overlapping in the subject matter

which cannot be shown in such a broad classification scheme. Of the theses now on file, from 64 institutions, 787 were presented for Masters' and 1,009 for Doctors' degrees; 1,422 were from colleges and universities and 374 from teachers colleges; 767 were printed and 1,029 were manuscript theses.

Several institutions have made the Office of Education library a depository for all of their theses dealing with any phase of education. This has worked well. It was inaugurated by New York University, Pennsylvania State College, Boston University, Syracuse University, and the University of West Virginia. One institution refers all requests for loan of such theses to the Office. Several other institutions place on file in this library all of their printed theses in education, among them, Teachers College (Columbia University), Catholic University of America, and George Peabody College for Teachers.

A number of theses have been deposited in the library by graduate students who had borrowed theses themselves, or who had seen the list of theses in the current numbers of *School Life*, and who wished to have the results of their own research made available for other students.

In order to give as wide publicity as possible to this research collection, the Office of Education, in its annual bibliography of research in education, marks the theses received during that year with an asterisk (*). Two pamphlets have also been issued dealing with theses available for loan: a list of recent theses in education and available for loan, which was issued in December, 1931; and Doctors' theses in education, a list of 797 theses deposited with the Office of Education and available for loan. The latter included theses received before September 15, 1934, and was issued in June, 1935.

Current numbers of *School Life*, the official organ of the Office of Education, include a selected list of the most recently received Masters' and Doctors' theses.

In addition to these bibliographies, typewritten lists are prepared showing the most recently completed theses in special fields, in answer to requests from students and faculty members of institutions of higher education. It is possible to secure, for example, a list of recent theses on file in the library on teaching techniques, elementary English, problems on methods of grading, or on similar subjects.

The collection is in constant use in the library by students, some of whom come to Washington especially to use it, by members of the staff of the Office of Education, and by students throughout the country who borrow theses on interlibrary loan. Since 1932 a total of 674 loans have been made by mail.

The following colleges and universities, listed alphabetically, are represented in the thesis collection: American, Arkansas, Boston, Bryn Mawr, Buffalo, California, Catholic University of America, Chicago, Cincinnati, Colorado, Colorado State Teachers, Columbia, Cornell, Denver, George Washington, Georgia, Hampton, Harvard, Hawaii, Idaho, Illinois, Indiana, Iowa, Johns Hopkins, Kansas, Kansas State Teachers, Kentucky, Louisville, Loyola, Maine, Marywood, Michigan, Minnesota, Missouri, Nebraska, New Mexico, New Mexico State Teachers, New York State College for Teachers, New York, North Carolina College for Women, Northwestern, Ohio State, Oregon, George Peabody College for Teachers, Pennsylvania, Pennsylvania State, Pittsburgh, Presbyterian College of Christian Education, Rutgers, South Carolina, Southern

EDUCATIONAL THESES IN THE OFFICE OF EDUCATION LIBRARY, AS OF JULY 1, 1935

Subject	Masters'	Doctors'	Subject	Masters'	Doctors'
Administration of schools	7	25	Occupations	6	8
Adult education	4	7	Parent education	1	2
Agriculture	5	1	Part-time education	1	..
Arithmetic	11	9	Personality training	5	6
Art	19	1	Physical education	24	12
Associations	2	6	Placement	5	8
Athletics	28	6	Play	1	1
Attendance	..	1	Practice teaching	4	8
Attitudes	8	7	Principals	4	3
Boards of education	1	..	Private schools	1	1
Books and periodicals	5	3	Professional education	4	3
Camps and camping	2	2	Progress in school	2	14
Character education	5	4	Promotions	4	3
Child study	8	26	Psychology	14	80
Children, exceptional	17	29	Publicity	4	2
Coaches	2	1	Racial groups, education	1	4
College professors	..	10	Radio	..	2
Commercial education	14	8	Reading	10	15
Consolidation	11	2	Reading interests	7	..
Curriculum making	15	20	Recreation	11	..
Deans	2	2	Religious education	10	26
Degrees, graduate	..	3	Reports and records	6	8
Diaries	..	1	Research, educational	1	3
Diet	1	1	Retardation and elimination	..	4
Dramatics	4	3	Rewards and prizes	1	2
Education—biography	4	5	Rural education	6	4
Education—foreign countries	16	38	Safety education	1	..
Education—history	8	29	School buildings and equipment	6	18
Education—theories	14	20	School finance	8	35
Education—laws	5	12	Science	19	14
Educational psychology	2	4	Secondary education	10	8
Elementary education	4	2	Sex education	1	..
English language	16	21	Shorthand	5	..
Equalization, educational	..	3	Social studies	7	3
Ethics	..	2	Sociology, educational	8	22
Examinations	7	4	Spelling	..	6
Experimental education	..	2	Statistics, educational	2	2
Extra curricular activities	12	7	Student selection	..	2
Failures	6	3	Study methods	1	2
Geography	3	2	Summer school	..	1
Graduates	5	3	Supervision	2	17
Handwriting	2	2	Surveys	3	..
Health education	30	26	Teacher training	2	26
Higher education	14	22	Teacher training—in service	1	7
History	10	5	Teachers—certification	3	3
Home economics	9	8	Teachers—leave	..	1
Individual differences	..	2	Teachers—load	7	..
Industrial education	10	3	Teachers—married	..	2
Internationalism	..	3	Teachers—pensions	..	2
Journalism	3	1	Teachers—salaries	1	7
Junior colleges	2	3	Teachers—tenure	2	5
Junior high schools	9	1	Teaching aids	..	3
Latin	7	3	Teaching methods	18	22
Leisure	9	..	Tests and scales	20	51
Libraries	5	2	Textbooks	24	1
Literature	18	13	Transportation	1	2
Marks and marking	4	4	Vacations	..	1
Mathematics	12	16	Visual education	10	3
Mental hygiene	1	4	Vocabulary studies	2	4
Modern languages	10	7	Vocational education	..	7
Music	20	10	Vocational guidance	12	2
Normal schools	6	13			
Nursery schools	1	3	Total	787	1009

California, Stanford, Syracuse, Teachers College (Columbia University), Temple, Tennessee, Tulane, Virginia, Virginia Polytechnic, Washington, West Texas State Teachers, West Virginia, Wisconsin, and Yale.

The library collects, and has available for consultation, abstracts of theses from the institutions which now issue abstracts.

Survey of Legal Education.—The *Annual Review of Legal Education in the United States and Canada for the Year, 1934*, by A. Z. Reed, published by the Carnegie Foundation for the Advancement of Teaching, includes a discussion of "The Salaried Professor in the Learned Professions." The section of the report dealing with the salaried professor ends as follows:

"The problem of insuring that young men and women shall be adequately prepared for their professional responsibilities has been attacked differently in different occupations at different times, and is far from having been solved for any one of them. Certain elements of the solution, however, are beginning to be clear. The salaried university professor is destined to occupy an important—in some ways, because of the independence of thought for which he traditionally stands, the most important—position in the professional world. He is the acknowledged expert in educational matters. As such, he shares the qualifications, but also the limitations, of his type. Possessing infinitely greater knowledge and capacity than a mere layman can ever hope to acquire, he is subject to the temptation of confusing the part which he knows best with that whole of which we all know so little. Soldiers, bankers, educators—to cite only outstanding groups—cannot safely be left to themselves. They are liable, in all honesty, to identify the well-being of the community with that of their particular institution, organization, professional coteria, or social class. Under conditions of popular self-government, the expert must inevitably share responsibility with those who are less well-informed and less efficient. He may lead, he may guide, but he cannot run counter to or ignore his professional colleagues. Nor is he obliged to reckon only with fellow professionals; he is in the web of life. Equally with them, he is judged finally by uninstructed, common men. He helps to mold, but he does not govern, public opinion."

The review of legal education indicates real progress in bar admission requirements, condemns anti-Semitism, and records outstanding developments among the law schools. Comparative tables show the present requirements for admission to the bars of each of the sixty states and Canadian provinces, and changes in the number of law schools of different types, and of their students, since 1890. The individual schools are listed, with their tuition fees, student attendance, and the time required to complete the course, in parallel columns, distinguishing from the 82 full-time law schools of the United States and the 4 full-time law schools of Canada, the 111 part-time or "mixed" schools in this country that offer instruction at hours convenient for self-supporting students, and the 6 Canadian schools in which the students serve a concurrent clerkship in a law office.

An appendix shows the number of lawyers in the several states and Canadian provinces at successive census dates, quotes the current standards of the American Bar Association and of the Association of American Law Schools, and lists the publications of the Carnegie Foundation dealing with legal education and cognate matters. Copies of these publications, including the present report, may be had without charge upon application by mail or in person to the office of the Foundation, 522 Fifth Avenue, New York City.

Guggenheim Fellowships. — The *Reports of the Secretary and of the Treasurer*, 1933 and 1934, of the John Simon Guggenheim Memorial Foundation, 551 Fifth Avenue, New York City, contain rather detailed accounts of the publications and accomplishments of the fellows of the Foundation. The tenth annual series of Fellowship awards was made in 1934. The purpose of the Foundation is expressed in Senator Guggenheim's letter of gift:

"We strongly hope that this Foundation will advance human achievement by aiding students to push forward the boundaries of understanding, and will enrich human life by aiding them in the cultivation of beauty and taste. If, at the close of our lives, looking both backward and forward, we can envision an endless succession of scholars, scientists, and artists aided by the John Simon Guggenheim Memorial Foundation, devoting themselves to these purposes, we shall feel that, with the help of our associates, we shall have accomplished the aim which we had set before us, in memory of our son."

The Slater Fund and Negro Education. —The John F. Slater Fund has published a study of *County Training Schools and Public Secondary Education for Negroes in the South* by E. E. Redcay. The county training school is shown in the study as the early fore-runner of the Negro high school. The Foreword, written by Mabel Carney of Teachers College, Columbia University, outlines in an impressive way certain of the problems of Negro education and the contribution of the Slater Fund to the solution of such difficulties.

"Every tenth resident of the United States is a person of African descent. Our twelve million Negroes, in other words, constitute one-tenth of the total population. Of the 31,500,000 children 5 to 17 years of age in our population, almost 3,000,000 or another 10 percent are colored. Proportionate comparisons end here, however, for as is commonly known, these three million children of the Negro race suffer most unfortunate discrimination. Their school terms average 2 months less than the white school year; attendance is difficult and irregular; enrollment is congested in the first three grades; buildings are dilapidated and inaccessible; and teaching equipment is meagre or lacking. Even more serious is the instructional situation under which large numbers of unqualified teachers are still retained and paid salaries averaging less than half of the white school salaries. Dominating all else is the problem of financial support, involving a current annual expenditure of $87.22 per child for the United States as a whole but an annual expenditure of only $12.57 for the average Negro child.

"The John F. Slater Fund, under which County Training Schools have been promoted, was the first educational foundation in the United States to be devoted wholly to the education of Negroes. Being first in the field it has naturally developed pioneer characteristics and has worked out a number of basic principles adopted later by other philanthropic agencies. One of these has been the principle of building on the basis of reality and of meeting people and conditions where they were at the time of contact. Twenty or more years ago when the Slater Fund became interested in public secondary education for Negroes public opinion in the South would hardly have tolerated the idea of secondary education for Negroes. It was quite willing, however, to embrace the suggestion of *industrialized* schools in which the Negro youth of the period might be *trained* for greater efficiency in farming, home-making and teaching. To develop these self-same schools years later into full-fledged high schools became a comparatively easy task.

"Another basic principle of Slater Fund policy, widely adopted since by later foundations, has been the splendid coöperation induced through its aid. County Training Schools, in general, throughout the years of their existence have been supported only in part by Slater funds, much of the remaining cost being advanced by public school officials from local revenues. This has proved a

most influential force in stimulating the interest and in the changing of attitudes of those responsible for the distribution of public money."

The major conclusions of the study are as follows:

1. There has been amazing growth in secondary education in general during the period of this investigation. In the Negro aspects of this growth the Slater Fund has exerted profound influence. Notwithstanding this progress, however, in 1933 there were still 190 counties in the South entirely without public secondary facilities for Negroes.

2. Public high schools for Negroes are *small* and because of this smallness require special adaptation and modification of general secondary school procedure.

3. Negro children in rural areas do not yet share the same opportunity for secondary education as that afforded the Negro child in urban centers.

Radio and Children.—Within the past year the Radio Institute of the Audible Arts, 80 Broadway, New York City, has been founded by Philco Radio and Television Corporation to "further the advancement of radio and to secure for every listener the full benefit and satisfaction that can be derived from the radio as an instrument of entertainment and education," with Pitts Sanborn as director. The Institute has an advisory committee consisting of: Lyman Bryson, Professor of Education at Teachers College, Columbia University; Boake Carter, news commentator; Peter W. Dykema, Professor of Music Education, Teachers College; Mr. Thomas H. Reed, Chairman of the Committee on Civic Education by Radio; Sigmund Spaeth, writer, musician and lecturer; Dr. Levering Tyson, Director, National Advisory Council on Radio in Education; and Mrs. Sidonie Matsner Gruenberg, Director of the Child Study Association of America.

The Institute has published a study of the *Radio and Children*, by Sidonie M. Gruenberg, and a *Survey of Children's Radio Programs*, by a special Radio Committee of the Child Study Association of America, of which Mrs. Gruenberg is director.

In making the survey of current children's programs for the Institute, the Radio Committee of the Child Study Association reviewed not only those programs designed expressly for children, but also certain adult programs of possible interest to children given at hours when they might be listening. The Committee's listing represents a group opinion, based upon the discussion of individual reviews by members of the Committee and their children, and the criteria which have developed out of the discussions.

The Committee lists the following typical children's programs presented by the major networks, which seem to meet the suggested standards of emotional emphasis, good taste, truthfulness, attitudes and sentiment, language and quality, and advertising: Singing Lady, Nursery Rhymes, Terry and Ted, Roses and Drums, Buck Rogers, Bobby Benson, Billy and Betty, Let's Pretend, Radio Theatre, Junior Radio Journal, The Puzzlers, and Chats About Dogs.

It is emphasized that the listing is intended only as a preliminary guide to current programs; some programs not included may be unobjectionable for certain children, and some listed may be unsuitable for others. The individual child's age and his special needs and interests must always be taken into consideration by parents and teachers. The list will be brought up to date this fall, and will be revised and amplified.

Australian Secondary Education.—Following its recent publication of the volume entitled *The Education of the Adolescent in Australia*, the Australian Com-

cil for Educational Research has set up a committee which will undertake an intensive study of the problems of secondary education. It is hoped that, after fortnightly meetings extending over a number of months, the committee will be able to issue a report which will exercise a marked influence over future developments in secondary education in Australia. The problems to be considered include: objectives, types of secondary schools, compulsory attendance in relation to secondary education, articulation, curriculum, teaching methods, teaching staff, examinations, and guidance of pupils.

Spearman-Holzinger Unitary Trait Study.—During the Spring of 1933 about one hundred tests were administered to two groups of pupils. One of these groups consisted of about 700 children in the Mooseheart schools, while the other included nearly 400 children in the Thorp Elementary School at Chicago. Two samples of data have been selected from the above groups, for which all intercorrelations have been computed, running to several thousand in number. Tables of these intercorrelations and other constants have been presented in the first three preliminary reports. The other reports include various analyses of the data.

Reports I to 5 have been printed in planograph form in a limited edition, which is now available to workers in factor analysis. Subsequent reports may also be obtained when ready. These reports are a record of progress on the Unitary Traits Study at the Statistical Laboratory, the University of Chicago. The general publication of results will appear at a later date. The preliminary reports are intended for workers especially interested in factor analysis.

A uniform charge of 60 cents for each report has been set, partially to defray the cost of re-printing and mailing. The reports will be mailed post-paid as a set of five for $3.00, or separately at $.60 per copy, and may be secured from Miss Frances Swineford, Department of Education, University of Chicago.

Coöperative Study of Fractions.—G. M. Wilson of Boston University is sponsoring a coöperative study in the teaching of useful fractions and has available at cost certain materials for use in this project. He points out that, in life, fractions are much simpler than in the average school, since 97 percent of adult usage is covered by halves, fourths, thirds, eighths, twelfths, and sixteenths. A summary of usage of fractions, based on the combined results of a number of studies, is as follows:

SUMMARY OF 19306 FRACTIONS

Denominators of the Fractions	Number of Different Fractions	Frequency	Percentage
Halves	1	10,180	52.730
Quarters	2	3,522	18.243
Thirds	2	1,324	6.858
Fifths	4	67	.347
Sixths	5	408*	2.114
Sevenths	4	12	.061
Eighths	7	1,723	8.924
Ninths	7	23	.120
Tenths	8	63	.325
Elevenths	3	3	.015
Twelfths	11	1,772	9.174
Thirteenths	0	0	0
Fourteenths	0	0	0
Fifteenths	5	5	.025
Sixteenths	13	174	.902
Above Sixteenths.	20	30	.152
Total	92	19,306	99.99

*Most of these are from one previous study. Authenticity is questioned. Possibly some are reductions from twelfths.

Kappa Delta Pi Award. — The third research award of $1,000 will be offered by Kappa Delta Pi as the contribution of this honor society in education to the celebration of the coming centennial of Horace Mann and the common school revival, for the best original study treating any significant phase of the history of American education.

Manuscripts will be reviewed by the Executive Council of the Society and by such expert students of the problem involved as the Council may select. The three, four, or five manuscripts deemed most worthy by these judges will then be submitted to a committee of the Laureate Chapter of the Society for final decision. While in judging the manuscripts, the first question will be whether they meet the recognized standards of historical scholarship, the factors of organization, literary style, and probable appeal to an educated lay public will also enter into the decision. Manuscripts will be considered for the award only under the following conditions:

1. Each must represent original and unpublished work.

2. Although longer or shorter manuscripts will be considered, preference will be given (other things approximately equal) to manuscripts of about three hundred (300) double-spaced typed pages, 8½ x 11 inches, exclusive of appendices and bibliographies. It will expedite the work of the judges if two copies of each manuscript are sent.

3. While joint or coöperative authorship is not discouraged, each manuscript must be submitted in the name of one person.

4. Names should not appear on the manuscripts. Name and address should be sent with the manuscript in a sealed envelope and an identifying number or mark should be placed on the envelope and on the manuscript.

5. The competition is open to anyone anywhere, but reports must be submitted in the English language.

6. The Society through its Executive Council reserves the right to reject any manuscript or all manuscripts, and the right to divide the award among two or more contestants if, in the opinion of the judges, such a division is justified.

7. The award-winning manuscript or manuscripts will become the property of the Society and may be published in its Research Studies without cost to the author or authors. If the net sales should exceed the total cost of the award and of publication (including distribution and pro-rated overhead) the balance will be divided equally between the author or authors and the Society on the basis of an annual accounting.

8. At its discretion, and with the consent of the authors, the Society may accept for separate publication in its Research Studies or (perhaps in abridged or condensed form) in the *Kadelpian Review* manuscripts that are not included in the award.

9. The Society assumes no responsibility for the loss or damage of manuscripts while in its possession or while in transit. Contestants who desire manuscripts to be returned, if unsuccessful, should send return postage.

10. To be considered in the competition, manuscripts must be in the hands of the Recorder-Treasurer of the Society, E. I. F. Williams, Heidelberg College, Tiffin, Ohio, not later than September 1, 1939.